PART B. PUBLIC COMMENTS AND DOE RESPONSES

This part gives DOE's response to comments received during the public comment period. Comments received during the public meetings held in North Augusta, South Carolina are summarized in this part. The transcripts from the meetings and forms received through the South Carolina State Clearing House can be found at the end of this document. Letters and the transcriptions of telephone comments received over DOE's message line are also reproduced in this part. The responses focus on comments specifically related to APT subject matter.

DOE published the *Draft Environmental Impact Statement for the Accelerator for the Production of Tritium* in December 1997. On January 13, 1998, DOE held public meetings on the Draft EIS in North Augusta, South Carolina. The public comment period officially ended on February 2, 1998. However, to the extent practicable, DOE has considered comments received after February 2. This Final EIS (FEIS) is available in DOE reading rooms in Washington, D.C. and Aiken, South Carolina. DOE has distributed copies to individuals, public agencies, Federal and State officials who requested a copy, and to persons and agencies who commented on the Draft EIS. A distribution list can be found starting on page DL-1.

Court reporters documented comments and statements made during the two public meeting sessions. In those two sessions, six individuals provided comments or made public statements. DOE also received eight letters (including one by electronic mail and the South Carolina Clearinghouse Forms) on the Draft EIS. Two individuals left three messages by telephone on DOE's message line.

This section presents the comments received and the DOE responses to those comments. It includes comments made both verbally and in writing. If a statement prompted a modification to the EIS, DOE has noted the change and directs the reader to that change.

Comments are noted by one of the following letter codes:

- M1 – M2 (comments submitted in either session 1 or 2 of the public meeting)
- L1 – L8 (comments received by letter or email)
- P1 – P3 (comments submitted by telephone to DOE's message line)

DOE numbered the specific comments in each letter or verbal presentation sequentially (01, 02, etc.) to provide unique identifiers. The meeting participants are listed in Table B-1. Comments are organized into categories, which are discussed below. Table B-2 lists the individuals and government agencies that submitted comments by letter or telephone and their unique identifiers.

The Department extends its gratitude to all the individuals and agencies who have shown the interest and taken the time to provide comments.

Public Meetings

The public meetings consisted primarily of informal discussions and questions and answers related to the APT. In this section, each public meeting speaker is identified and his or her statement paraphrased since some statements span several pages of the transcripts (found at end of this document). Because the commenters had common themes, some comments have been combined and the Department has prepared one response for that category of comment.

As can be seen from the following discussions, a number of public comments and concerns were raised and discussed with Department officials during the meetings. The responses in this document focus on those comments or questions which were not answered during the meeting, or need elaboration or clarification.

Table B-1. Public meeting comments on the Draft APT EIS.

Comment source number	Commenter	Transcript page number
Commenters at the public meetings		
M1-01	Mr. David Solki[a]	M1-2 to 3
M1-02	Mr. William Reinig	M1-3
M1-03 to M1-06	Mr. Bob Newman	M1-4 to 11, 16
M1-07 to M1-11	Mr. Peter Gray	M1-11 to 16, 20
M1-12 to M1-14	Mr. Ernie Chaput	M1-16 to 20
M2-01	Ms. Trish McCracken	M2-2 to 14

a. Name spelled incorrectly in meeting transcripts.

Table B-2. Public comments by letter and telephone on Draft APT EIS.

Comment source number	Commenter	Response page number
Comments received by letter		
L1	U.S. Department of Health and Human Services	B-8
L2	U.S. Department of Interior	B-12 to B-14
L3	Dr. David Moses	B-19 to B-23
L4	U.S. Environmental Protection Agency	B-26
L5	Mr. Russell Berry	B-28
L6	Dr. David Moses[a]	B-30
L7	Dr. David Moses	B-46
L8	South Carolina State Clearing House	Transcripts and State Clearing-house Forms
Comments received verbally to the DOE message line		
P1	Ms. Mary Barton	B-47
P2	Mr. Marvin Lewis	B-47
P3	Mr. Marvin Lewis	B-48

a. A letter submitted during the TEF EIS comment period by Dr. Moses and DOE's response are also included because some of the comments are related to the APT project. The letter is coded as TEF-01 starting on page B-34. The response starts on page B-39.

Most of the comments and issues discussed in the meetings fall into the following broad categories:

- Expression of support for the Accelerator Project - Mr. David Solki (M1-01), Session 1, page 3

  Mr. Solki, representing Carpenters Local 283, stated the building trade is supportive of the accelerator.

Response to Comment M1-01: The Department is grateful to the community for its continued support of Department of Energy missions.

- Selection of weighting factors for site selection - Mr. William Reinig (M1-02), Session 1, page 3

  Mr. Reinig asked why the weighting factor for health is less than the other factors considered.

Response to Comment M1-02: In the development of site selection criteria, human health issues were an inherent part of establishing exclusionary zones. Since human health was already considered, other considerations were given more weight. The weightings were developed by a multidisciplinary team of scientists and engineers.

- The use of non-renewable resources - Mr. Bob Newman (M1-03), Session 1, page 4; Mr. Peter Gray (M1-10), Session 1, pages 14-15

Two commenters, Mr. Newman and Mr. Gray, expressed concern over the electricity required to operate the APT, the consequent use of fossil fuels, and possible contribution to the greenhouse effect.

Mr. Newman stated: "…to select an alternative which is going to consume rather substantial quantities of fossil fuel compared to using a nuclear reactor which is producing energy, seems to fly in the face of NEPA dictates to conserve nonrenewable resources, coal or gas, building materials and so forth."

Mr. Gray similarly stated that "electric power produced by fossil fuels…release greenhouse gases."

Response to Comments to M1-03 and M1-10: The Department acknowledges the large electricity requirements of the APT. Part of the ongoing design process is to investigate and introduce, if the APT is selected and built, as many energy-saving and resource-recovery features as possible. DOE and SCE&G (if they are ultimately the provider of electricity to the APT) recognizes that the use of renewable energy sources can be cost-effective, offer opportunities to reduce fuel imports and is a way to improve environmental quality. It is DOE's intent that it and the electricity provider would make a fixed known portion of the power supplied to the APT from renewable sources. DOE's Preferred alternative for supplying electricity is to use existing electricity sources from commercial providers. While this does not negate the incremental demands from servicing the APT load, it does offer a number of other advantages, including lower capital requirements to bring the facility online and no new land requirements. In the states of South Carolina and Georgia, the increased electrical demand that could be attributed to the APT is negligible. Likewise, the contribution to the greenhouse effect is negligible compared to the installed base of facilities using fossil fuels. The Chapter 5 (Cumulative Impacts) discussion on cumulative air quality impacts has been revised to show a comparison of greenhouse-contributing pollutants from a representative plant supplying power to the APT to that generated regionally and globally in the absence of the APT.

- Worker Health and Safety - Mr. Bob Newman (M1-04), Session 1, page 9

Mr. Newman, questioned why the EIS considered the impacts to an uninvolved worker at 640 meters from the APT site, but not workers at the APT.

Response to Comment M1-04: The Department has not quantified the potential impacts from accidents to involved workers (those at the facility) because it requires too many assumptions to make the analysis meaningful. Current state-of-the art models do not present valid results within 100 meters of a facility, so a hypothetical maximally exposed individual cannot be identified. The 640-meter distance is related to commercial reactor exclusionary zones and relates to uninvolved individuals. The Department, however, is concerned about worker health and safety and will continue to maximize worker protection through facility design, operational guidelines, and adherence to permit conditions and regulatory health and safety programs. Impacts to facility workers are described in Chapter 4, Section 4.2.1 of the Draft EIS.

- Project Cost - Mr. Bob Newman (M1-05), Session 1, page 9; Mr. Peter Gray (M1-10), Session 1, pages 14-15; Mr. Ernie Chaput (M1-13), Session 1, pages 17-18

Three individuals, Misters Newman, Gray, and Chaput, expressed concern over the cost of the proposed APT, questioned how it compares to the Commercial Light Water Reactor tritium production option, and expressed some skepticism that the project would be funded.

Mr. Newman questioned the accelerator cost of $3.5 to $4.5 billion and how that compares to the cost of a reactor.

Mr. Gray indicated that he didn't believe the accelerator will be built, in part, because it would cost $4.5 billion and Congress will never authorize that much money.

Mr. Chaput raised the issue of uncertainty between the costs of the APT versus a commercial light-water reactor. He indicated the cost information needs to be made available.

Response to Comments M1-05, M1-10, and M1-13: The APT EIS was prepared in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality's Regulations on Implementing NEPA (40 CFR Parts 1500 through 1508), and the Department of Energy's NEPA Implementation Procedures (10 CFR Part 1021). None of these require inclusion of a cost analysis in an EIS. The basic objective of this EIS is to provide the public and the Department's decision-makers with a description of the reasonable alternatives and their potential environmental impacts. While costs could be an important factor in the Department's decision regarding the production of tritium, the focus of an EIS is on the environmental consequences. Cost estimates for both the APT and the Commercial Light Water Reactor (CLWR) are refined as new information is developed. In December, 1998, total life cycle costs for the APT ranged from $7.5B to $9.2B. CLWR total life cycle costs ranged from $1.1B to $3.6B.

- The review of the APT EIS – Mr. Bob Newman (M1-06), Session 1, page 10.

  In his opening remarks, Mr. Clay Ramsey of DOE stated that the EIS had been peer reviewed. Mr. Newman, in his subsequent statements, indicated he did not think a review by Westinghouse on a Westinghouse operation or by DOE on a DOE operation is independent.

Response to Comment M1-06: The review group referred to was not the Westinghouse Savannah River Company (WSRC) or DOE, but rather the Environmental Advisory Committee (EAC). The EAC is a group of nationally renowned scientists and engineers who periodically review information and plans and provide SRS with independent evaluations. The EAC is totally independent of WSRC and DOE.

- Use of Reactor to Produce Tritium – Mr. Peter Gray (M1-07 through M1-09, M1-11), Session 1, pages 12-13, page 15

Mr. Gray stated that he invented a new concept for tritium production and he has been unable to make the information public or receive a patent because of DOE and WSRC interference. Mr. Gray also contends a site-specific analysis should be performed by DOE.

Response to Comments M1-07 through M1-09, M1-11: Mr. Gray's device is in fact a reactor. He published a paper in 1995, "Safe New Reactor for Radionuclide Production" in *Transactions of the American Nuclear Society* (TANSAO, 73, 1-552). This paper was reviewed by DOE and WSRC for classification and approval for publication. This refutes Mr. Gray's assertion that his concept had "been covered up by WSRC and DOE for the last six years."

DOE determined that Mr. Gray's patent application contained Unclassified Controlled Nuclear Information (UCNI) as defined in 42 U.S.C. 2168. The U.S. Patent Office does not recognize the UCNI designation. It recognizes only classified or unclassified patents. Therefore, DOE issued a secrecy order.

DOE has taken a second look at Mr. Gray's request, and still considers the patent application UCNI. A letter has been sent to Mr. Gray informing him of this result. DOE is also required to re-examine the patent application every year for possible declassification. If and when DOE determines that protection is no longer necessary, DOE will lift the secrecy order and UCNI classification and allow the patent to be processed.

Mr Gray's concept is a small advanced Heavy Water Reactor for tritium production that would be built at the SRS. He opined that such a device would be the least costly tritium production alternative, while also being safe, efficient, and environmentally-sound. As discussed in section 1.5 of the APT EIS, the APT EIS is a tiered document which follows the Record of Decision for the Tritium Supply and Recycling PEIS. As such, the scope of the APT EIS is limited to evaluating the environmental impacts of the reasonable APT alternatives for providing the tritium necessary to support the enduring stockpile.

Reactor alternatives such as the small advanced Heavy Water Reactor are not reasonable alternatives for the APT EIS. The Tritium Supply and Recycling PEIS (DOE/EIS-0161) evaluated the full range of reasonable technology alternatives for tritium supply. A Heavy Water Reactor was one of the reasonable alternatives evaluated. In addition, in Section A.3.1, the PEIS described potential technology innovations that might be incorporated into any of the reactor alternatives. For the Heavy Water Reactor, the PEIS described the potential technology innovations associated with a small advanced Heavy Water Reactor. As was explained in the Comment-Response Document (Volume III of the PEIS), if the Heavy Water Reactor were chosen in the Record of Decision (ROD), "site specific analysis would consider these types of improvements". However, in the ROD, DOE did not choose to build any new reactors, and did not choose the HWR technology. Consequently, no site-specific analysis of a small advanced Heavy Water Reactor has resulted.

- Proliferation - Mr. Peter Gray (M1-10), Session 1, pages 14-15; Mr. Ernie Chaput (M1-14), Session 1, pages 16-19

Two commenters, Mr. Gray and Mr. Chaput, expressed concern over how other nations will view the United States if it allows commercial nuclear facilities to participate in the making of materials for national defense.

Mr. Gray indicated that he did not believe the commercial light water reactor will ever be acceptable because such a use clearly violates the demarcation between swords and plowshares and that would set a dangerous precedent to international policy.

Mr. Chaput's comments were similar. Mr. Chaput stated that "the United States at this moment is jawboning North Korea, Iran, Iraq, other potential nuclear powers, to not make weapons materials in their commercial nuclear facilities. And for us to turn around and not practice what we preach, to be contrary to what we're asking these foreign countries do, I think would be a foreign policy disaster and would only serve to increase nuclear proliferation throughout the world."

Response to Comments M1-10 and M1-14: Dr. David Moses, Letter L3, raises the same issues as Mr. Gray and Mr. Chaput. Because of the length of the responses to these issues, all responses are consolidated under L3-14 to L3-18.

- Schedule for tritium production - Mr. Ernie Chaput (M1-12). Session 1, page 17

Mr. Chaput expressed concerns that the schedule described for construction of the APT does not meet the current approved nuclear stockpile requirements for tritium.

Response to Comment M1-12: The commenter is correct that under current stockpile direction and guidance, the selection and implementation of a tritium supply strategy will be required in the very near future. The relationship of current and projected tritium supply and the current and projected date for a new source to support the stockpile are described in Section 1.1 of the Draft EIS and the summary of this Final EIS.

- The use of American products and technical talent - Ms. Trish McCracken (M2-01), Session 2, pages 2-3

One commenter, Ms. Trish McCracken, expressed the opinion that all APT components and materials should be American made. The commenter also expressed the opinion that the APT should provide opportunity and training for employees who have been displaced by recent downsizing at the Savannah River Site.

Response to Comment M2-01: The Department is committed through its various contracts to "buy American" whenever possible, pursuant to The Buy American Act (FAR 25.202(a)(3)102) and the Department of Energy Acquisitions Regulation which implement Federal acquisition regulations. DOE is also interested in the employment of qualified individuals with Savannah

River Site experience. Some of the ongoing efforts include staffing by DOE's accelerator design and construction contractor, Burns and Roe Enterprises, Inc., and the programs being implemented by the Savannah River Regional Diversification Initiative and DOE and SRS outplacement programs. The transcript of session 2 of the public meeting (Transcripts at the end of this document) provides an extensive discussion of these issues. No changes were made to the document.

Letters:

The comment letters DOE received on the Draft APT EIS are reproduced in the following section with corresponding responses. The forms received from the South Carolina Clearing House (L7) are reproduced at the end of this document.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Atlanta GA

January 30, 1998

Andrew R. Grainger
Savannah River NEPA Compliance Officer
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A, Code APT, Bldg. 773-42A, Room 212
Aiken, South Carolina 29808

Dear. Mr. Grainger:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for Accelerator Production of Tritium (DOE/EIS-0270). Technical Assistance for this review was provided by the Radiation Studies Branch, Environmental Hazards and Health Effects Division, National Center for Environmental Health, Centers for Disease Control and Prevention (CDC). We are responding on behalf of the U.S. Public Health Service, Department of Health and Human Services.

This review focuses on the public health consequences associated with several proposed alternatives for Accelerated Production of Tritium (APT) at the Savannah River Site (SRS). General comments are provide in the following bullets for your consideration.

- This DEIS provides a very thorough analysis of potential impacts from the proposed accelerator. It is well written, documented, and referenced. This has greatly improved the usefulness of this document in conveying to the reader the information necessary to do a thorough review. The authors should be commended for providing this useful information.

- Public health impacts (especially doses to the public) from the proposed APT are quite low even with the substantial conservatism used in the forecast. This conservatism is especially apparent in summing doses from the liquid pathway and atmospheric pathway even though the maximum exposed individuals reside at almost opposite ends of the site (reference: Table 4-22, footnotes a and b).

- A minor change in format may improve the review of the document. For example, line numbering has been introduced in a draft EIS from the Hanford site (Draft Hanford Remedial Action Environmental Impact Statement and Comprehensive Land Use Plan, 1996). This addition greatly improved the reviewer's ability to do a thorough review. We recommend the DOE consider this approach for aiding reviewers of future draft reports.

L1-01

- The DOE has published a Notice of Intent to prepare an EIS for the production of Tritium using Commercial Light Water Reactors (CLWR). The potential public health impacts from APT and the CLWR technologies will differ in several aspects; impacts will occur in different locations and impacts will come from different source terms. These differences will also result in different volumes and hazards of wastes generated, stored, and transported in and around these proposed sites. There should be some mechanism in place to evaluate the APT and CLWR technologies together to assess these widely varying impacts adequately.

L1-02

Thank you for the opportunity to review and comment on this DEIS. We hope that these comments and suggestions will be helpful to the preparers. If you have questions about this review, you may contact Mr. Robert Whitcomb at (770) 488-7634, or me at (770) 488-7074. Please send me a copy of the Final EIS, and any future environmental impact statements which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely,

Kenneth W. Holt

Kenneth W. Holt, MSEH
Special Programs Group (F16)
National Center for Environmental Health

cc: Robert C. Whitcomb, Jr.

Response to Comment L1-01 (U.S. Department of Health and Human Services)

The Department agrees line numbering generally enhances the commenter's ability to respond to information presented in Draft EISs. In this particular case, however, line numbers were not used because of the double column format and the use of text boxes. The Department believed line numbering could result in a very cluttered page that could inhibit readability.

Response to Comment L1-02 (U.S. Department of Health and Human Services)

The Department assessed the commercial light-water reactor, other reactor technologies, and the accelerator for the production of tritium options in the *Final Programmatic EIS for Tritium Supply and Recycling* (DOE 1995). In its subsequent Record of Decision (60 FR 63898), the Department decided to pursue a dual track to determine the more viable primary technology, an accelerator or a CLWR. In January 1998, the Department issued a Notice of Intent (63 FR 3097) to prepare the CLWR EIS. The Draft EIS was issued August 1998. The relationship of the tritium supply EISs and the decisionmaking strategy is summarized in Part A.1 of this document.

As noted in this Final EIS, the No Action alternative for the APT is the CLWR. Thus, the two EISs (CLWR and APT) each provide information that allows the decisionmaker to compare environmental impacts of the alternative tritium production strategies. The potential environmental impacts of the CLWR are summarized in Part C of this document under the Chapter 2 changes on page C-3 and Chapter 4 modifications on pages C-37 through C-53.

On December 22, 1998, Secretary of Energy Bill Richardson announced that commercial light water reactors (CLWR) will be the primary tritium supply technology. The Secretary designated the Watts Bar Unit 1 reactor near Spring City, Tennessee, and Sequoyah Unit 1 and 2 reactors near Soddy-Daisy, Tennessee as the preferred commercial light water reactors for tritium production. These reactors are operated by the Tennessee Valley Authority (TVA), an independent government agency. The Secretary designated the APT as the "backup" technology for tritium supply. As a backup, DOE will continue with developmental activities and preliminary design, but will not construct the accelerator. Finally, selection of the CLWR reaffirms the December 1995 Tritium Supply and Recycling PEIS ROD to construct and operate a new tritium extraction capability at the SRS.

DOE has completed the final EISs for the APT, CLWR, and TEF. No sooner than 30 days after publication in the Federal Register of the Environmental Protection Agency’s Notice of Availability of the final EISs for CLWR, APT, and TEF, DOE intends to issue a consolidated Record of Decision to: (1) formalize the programmatic announcement made on December 22, 1998; and (2) announce project-specific decisions for the three EISs. These decisions will include, for the selected CLWR technology, the selection of specific CLWRs to be used for tritium supply, and the location of a new tritium extraction capability at the SRS. For the backup APT technology, technical and siting decisions consistent with its backup role will be made.

United States Department of the Interior

OFFICE OF THE SECRETARY
OFFICE OF ENVIRONMENTAL POLICY AND COMPLIANCE
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

January 26, 1998

ER-97/720

Andrew R. Grainger,
NEPA Compliance Officer
U. S.Department of Energy
Savannah River Operations Office
Building 773-42A, Room 212
Aiken, SC 29802

Dear Mr. Grainger:

The Department of the Interior has reviewed the Draft Environmental Impact Statement (DEIS) for Accelerator Production of Tritium at the Savannah River Site (SRS), Aiken and Barnwell Counties, South Carolina, as requested.

General Comments

The Draft Environmental Impact Statement (DEIS) presents several environmental impacts associated with each of the Cooling Water System alternatives. These proposed impacts include: modification of the hydro geology of the area through intensive groundwater utilization, impingement of adult and juvenile fish and entrainment of fish larvae and eggs through the intake of river water, reduced community diversity induced by thermal discharges, and toxicological impacts as a result of resuspension and transport of contaminants and enhanced availability of contaminated prey items (i.e., bald eagles foraging on a fish kill caused by thermal inputs). While some of the alternatives have fewer significant impacts, the DEIS fails to adequately present implementation of methods that would further reduce the remaining impacts associated with these alternatives.

The mechanical-draft cooling towers with river water makeup alternative could lead to resuspension of contaminated sediments in the Par Pond system and facilitate the migration of contaminants into other wetland areas. In addition, continual mobilization of contaminants could lead to an increase in bioavailable forms of contaminants, enhancing contaminant uptake in aquatic species and potentially enhancing the trophic level transfer of contaminants within this system. L2-01

This alternative is also estimated to lead to the entrainment 173,000 fish eggs and 326,000 fish larvae, and the impingement of more than 100 fish at the river water intake structures. Current levels of endangered/threatened anadromous fish in the Savannah River basin have caused federal and state agencies to initiate efforts to reestablish their populations to historical numbers. These goals have not yet been achieved; therefore, actions leading to the loss of any individuals of these species are considered to be significant. Further evaluation of this cooling water alternative should be expanded in the DEIS. We suggest that methods for reducing the amount of sediment disturbance and designing intake structures to minimize fish entrainment and impingement should be become an integral part of this alternative. L2-02

Implementing the mechanical-draft cooling towers with groundwater makeup alternative would eliminate the need for particular intake structure design. However, contaminant resuspension and transport issues should also be addressed for this proposed alternative. In addition, maintaining sustainable hydro geological conditions may not be feasible due to the combined demands of current groundwater use at the Savannah River Site (SRS) and Accelerator Production of Tritium (APT) groundwater makeup requirements. These combined groundwater demands may exceed the estimated production capacity of the aquifer and could lead to depletion of the aquifer. This could adversely impact wetland ecosystems by reducing stream flow, and potentially cause loss of some wetlands or a reduction in wetland community diversity. Altering groundwater flow may also influence sub-surface contaminant migration. Contaminate plumes identified in locations designated as "critical areas" may be leading to contaminant migration into areas which were previously at background levels. It is also predicted that groundwater could become contaminated as a direct result of the tritium accelerator operations. Migration of contaminated groundwater could lead to surface water discharges that would provide a route of exposure to wildlife receptors. Therefore, alternatives that would achieve sustainable hydro geological conditions and would not facilitate contaminant migration should be further developed for this alternative. L2-03

The implementation of the Once-Through Cooling alternative could lead to resuspension and transport of contaminated sediment, reduced community diversity, thermal induced fish kills, enhanced trophic level contaminant transfer (as a result of the fish kills), and entrainment and impingement of fish. Based on the multitude of environmental impacts associated with this alternative suggest that it be eliminated from the DEIS as a viable alternative for the proposed project.

The K-area cooling tower with river water makeup alternative could also lead to the entrainment and impingement of fish of the Savannah River. In addition, thermal water discharges to Indian

Grave Branch and Pen Branch could potentially result in a reduction of community diversity in these recovering systems. Implementations that could reduce the potential for these impacts would not only benefit this proposed alternative, but also the others that incorporate river water as a cooling water source. L2-03

We believe that the proposed alternatives for the APT site location are not adequately developed. The selection of a site location to date appears to have been extensive, however, the exclusion of industrial sites from the site selection process is unacceptable. Both alternatives presented would involve the grading or leveling of approximately 250 forested acres. For the preferred site alternative, the land contains unoccupied habitat approaching suitable age for utilization by red-cockaded woodpeckers. We suggest the DEIS site selection process be reevaluated to incorporate industrial locations in the process.

Specific Comments

Paragraph 4.2-15. Industrially developed areas were not examined as potential APT sites based on the following three criteria: (1) the presence of existing operating structures, (2) the presence of non-operating structures that would require extensive decontamination and decommissioning prior to site preparation, or (3) the presence of active environmental restoration activities. These criteria do not justify the exclusion of industrial areas with non-operating structures at which contamination and environmental restoration are not issues. The DEIS should be modified to evaluate such sites as a component of the site selection process. The DEIS should also provide a list of all sites considered in the site selection process and the criteria for which they did not qualify. This would insure that no sites were excluded based on their industrial nature. L2-04

Paragraph 1.3-55. The presentation of a bald eagle habitat in the Affected Area is limited in the DEIS to only the ATP site. The incorporation of all the areas predicted to be impacted by any, or all, of the accelerator operation alternatives should also be included (i.e., bald eagle foraging habitats in the "Pre-cooler" Ponds and Par Pond). L2-05

Paragraph 1.3-56. The presentation of a short-nose sturgeon habitat in the Affected Area is limited in the DEIS to only the tributaries of the SRS. The incorporation of all the areas predicted to be impacted by accelerator operation alternatives, including the Savannah River, should also be included L2-06

Paragraph 6.4-3 The use of groundwater wells to supply cooling water to the APT site could lead to the depletion of aquifers

beyond their capacity to replenish. Alternative methods to reduce the requirements for ground water from the proposed aquifer should be evaluated. The implementation of more than one of the cooling water alternatives may reduce the groundwater demands of the APT site while potentially reducing the impacts associated with the river water alternatives. If this is a feasible alternative, it should be developed in the DEIS. If it is not feasible to combine cooling water alternatives this information should also be presented in the DEIS. L2-07

Paragraph 12.4-4 Accelerator operations could lead to the contamination of groundwater and soil with radioisotopes that could be transported via groundwater. The potential impacts to "real receptors," those other than humans, from this contaminated groundwater are assumed to be minimal based on dispersion of contaminants during movement, and a calculated dose for a human receptor compared to the EPA drinking water standards. It is inappropriate to use the term "real receptor" in place of the term wildlife receptor, if this was the intention of the DEIS. In addition, calculations to predict a dose for a wildlife receptor should be performed using a toxicity reference value applicable to wildlife receptors. L2-08

Paragraph 7.4-6. The increased water flow associated with the cooling water discharge is suspected to agitate contaminated sediments in Par pond and Pen Branch, re-suspending and transporting them toward the Savannah River. Since all of the cooling water alternatives presented would discharge to one of these water bodies the DEIS should present methods that could reduce the disturbance of sediment (i.e., reduced discharge velocities and placement of permanent silt screens) that would minimize contaminant transport. L2-09

Paragraph 6.4-47. Entrainment of fish eggs and larvae and impingement of adult fish has been estimated at 173,000, 326,000, and 132, respectively, for both the Mechanical-draft Cooling Tower with River Water alternative and the K-area Cooling Tower with River Water alternative. The estimated values for the Once-through Cooling alternative are significantly higher. The DEIS fails to present methods that would reduce these estimated values, nor do they present intake velocities for the intake structures. Entrainment and impingement at the river water intake could be reduced by providing intake structures with traveling screens and by minimizing the velocity of the intake water. The DEIS should be modified to include this information. L2-10

Thank you for the opportunity to comment on the Draft EIS. Any technical questions related to fish and wildlife resources may be directed to the U.S. Fish and Wildlife Service in Charleston, SC, at 803/727-4707.

Sincerely,

James H. Lee
Regional Environmental Officer

Response to Comment L2-01 (U.S. Department of the Interior)

The Draft EIS did not specify detailed mitigation measures, particularly where the potential for adverse impacts are not significant or are speculative. The Department will develop appropriate mitigative actions, including the possible installation of monitoring wells for this EIS as part of its building and operations plans, and, if warranted, a mitigation action plan (MAP). Specific mitigation measures in the MAP would be dependent upon the alternatives selected and would fully reflect relevant Federal and State regulations. Part D, Section 4.6 of this Final EIS has been added to clarify DOE's path forward with regard to potential mitigation actions.

Since the issuance of the Draft EIS, the Department has considered other methods of discharging cooling water. Section 4.5.3 has been added to consider the potential impacts of bypassing Ponds 2 and 5, therefore, discharging cooling water into Pond C via an existing discharge canal. This action would eliminate any impacts associated with discharging cooling water to Ponds 2 and 5, and further reduce the unlikely possibility of predators feeding on potentially contaminated fish killed by heated water from the Once-Through Cooling Water alternative. The doses from resuspension of contaminated sediment for the preferred alternative are shown in Table 4-2 (Section C, page C-44) to be less than 10 percent of dose to the maximally exposed individual from radiological discharges and less than 1 percent of the population dose from radiological discharges from the APT.

Response to Comment L2-02 (U.S. Department of the Interior)

The Department acknowledges that implementing any alternative utilizing river water may result in the loss of some fish. If DOE is to fulfill its designated missions, some level of impact will be unavoidable. Previous studies relating to reactor operations have shown, however, that the losses are negligible. Studies conducted in the 1980s, when three production reactors were operating (withdrawing nearly 400,000 gallons per minute (gpm) of water from the Savannah River), concluded that any impacts to Savannah River fisheries from entrainment of eggs and larvae would be small and limited to fish populations in the immediate vicinity of the intake structures. Therefore, the Department believes that impacts to fish populations from the withdrawal of up to 125,000 gpm (under the Once-Through Cooling Water alternative) would be very small and the impacts from the withdrawal of 6,000 gpm (under the preferred cooling water alternative, using mechanical draft cooling towers) would not be measurable. The Department is currently removing about 5,000 gpm to maintain L-Lake levels. DOE has prepared a Biological Assessment (BA) and is informally consulting with the U.S. Fish and Wildlife Service. The BA notes that the preferred cooling water alternative would have "negligible" impacts on the shortnose sturgeon because (1) less than 1 percent of the Savannah River flow would be withdrawn and (2) potential sturgeon spawning habitat is upstream and downstream of the SRS.

Response to Comment L2-03 (U.S. Department of the Interior)

As required by the National Environmental Policy Act, the Department has assessed a range of reasonable alternatives related to providing cooling water to the APT. The Department of the Interior's comment portrays the environmental tradeoffs involved in making a selection of the cooling water alternative. The environmental impacts of alternative cooling water systems have been assessed and presented in the EIS. As indicated in the Draft EIS, DOE is aware of the potentially serious impacts of supplying mechanical draft cooling towers with makeup from groundwater. The Department will carefully weigh these potential impacts with those of other alternatives prior to making a decision. As noted in the response to Comment L2-01, the Department will consider appropriate mitigative actions.

Response to Comment L2-04 (U.S. Department of the Interior)

DOE did examine developed areas of the SRS during the APT site selection study. However, given the size of the APT footprint, it would not be feasible to locate the facility within an existing industrial area without impacting on-going operations. Furthermore, it would not be feasible to site APT at a non-operating facility that would require extensive decontamination and decommissioning, or an environmental restoration cleanup site (due to impacts on costs and schedule). DOE has modified this section in the Draft EIS (see Part C, page C-4 of the FEIS). A total of eight potential sites were considered. Several of the sites were eliminated due to the presence of disqualifying conditions. The site selection process is described on pages 2-13 to 2-16 of Draft EIS and in the siting study -- *Site Selection for the Accelerator for Production of Tritium at the Savannah River Site* -- available in the DOE Reading Room.

Response to Comment L2-05 (U.S. Department of the Interior)

DOE has expanded Section 3.4.5 of the Draft EIS (see Part C, page C-36), Threatened and Endangered Species, to include a more thorough discussion of bald eagle usage of SRS aquatic habitats, focusing on the pre-cooler ponds and Par Pond. The discussion of possible impacts to bald eagles has also been expanded, with consideration given to the possible effects of ingestion of contaminated prey in the pre-cooler ponds.

Response to Comment L2-06 (U.S. Department of the Interior)

The Department has also expanded Section 3.4.5 of the Draft EIS (see Part C, page C-37), Threatened and Endangered Species, to include a discussion of the distribution and abundance of shortnose sturgeon in the Savannah River up- and downstream of the SRS.

Response to Comment L2-07 (U.S. Department of the Interior)

Pursuant to NEPA, DOE has looked at a reasonable range of cooling water alternatives. While the Department has not looked at every possible perturbation, it believes the potential impacts discussed in the Draft EIS would bound the impacts associated with any combined cooling water alternative. The Department does not believe it would be cost efficient to utilize two supply systems when one is sufficient. As mentioned in the response to Comment L2-03, the Department will carefully weigh the information prior to making a decision.

Response to Comment L2-08 (U.S. Department of the Interior)

The use of the phrase “real receptor” was misinterpreted by the commenter. The intended meaning was an “actual user of groundwater” rather than “wildlife receptor.” However, under no circumstances would groundwater at the APT site be used as a drinking water source. The discussion was included to illustrate the low levels of radioactivity that would be in groundwater. Human beings would not drink the water and therefore would not actually receive any radiation dose. Wildlife receptors, which could be exposed to radionuclides in APT groundwater would receive a considerably smaller dose than the theoretical human receptor because potential radioactivity in ground water would be reduced over time by dilution, dispersion, adsorption, and radioactive decay as the groundwater flows from the area of the APT sites to downgradient streams. The Department believes the potential impacts described bound the potential impacts to wildlife.

Response to Comment L2-9 (U.S. Department of the Interior)

See response to comment L2-01.

Response to Comment L2-10 (U.S. Department of the Interior)

See response to comment L2-02.

130 Clemson Drive
Oak Ridge, Tennessee 37830-7664
February 2, 1998

Andrew R. Granger
NEPA Compliance Officer
SR Operations Office
Building 773-42A, Room 212
Aiken, SC 29808

Dear Mr. Granger:

The following comments and recommendations are submitted on the Draft EIS for the APT at SRS:

1. Radioactive Waste Classification and Management:

Comment: The disposal of certain radioactive wastes from the APT involves complex statutory and regulatory matters that, if not properly addressed, leaves confusion as to what the proper path forward is to resolution. To a great extent, the confusion and complexity lie in the fact that DOE has failed to issue regulations providing for the classification of radioactive wastes in a manner equivalent to and analogous with regulations issued by the U.S. Nuclear Regulatory Commission (NRC) to address commercially-generated radioactive wastes. The APT EIS does an inadequate job of explaining these complexities. Section 4.1.5, "WASTE MANAGEMENT," p. 4-20, states the following:

> "The APT would generate several hundred cubic meters of high concentration radioactive waste (Greater-Than-Class-C Waste) over its 40-year operational life; most would be mixed waste. DOE is investigating material substitutions that would minimize or eliminate this waste stream; however, if the waste was generated, the Department has several potential disposal options, each requiring more investigation. The most likely options are the proposed Yucca Mountain Repository in Nevada, the Hanford Site, the Nevada Test Site, and the SRS."

As described in SECY-92-325, accelerator-generated radioactive wastes are judged by NRC not to be within the NRC's authorities for licensing and regulation under the Atomic Energy Act, the Nuclear Waste Policy Act, and the Low-Level Radioactive Waste Policy Act. The NRC definition of Greater-Than-Class-C Waste that appears in 10 CFR 61.55 was made by the NRC to classify radioactive wastes that have characteristics of high-level radioactive wastes (HLRW) but could not be so classified under the NRC's strict definition of HLRW stemming from definitions and provisions in the above-cited statutes. Per 10 CFR 61.55, Greater-Than-Class-C Waste requires disposal in a geologic repository the same as spent fuel and HLRW unless NRC approves an exception to dispose otherwise (namely, near-surface land disposal). DOE's Office of Environmental Management (EM) has at times in the recent past chosen to designate as "special case waste." those radioactive wastes that are analogous with or equivalent to Greater-Than-Class-C Waste but that are not specifically covered by the above-cited statutes. Under DOE/EM guidance issued over the last two to three years, the APT waste designated in the draft EIS as Greater-Than-Class-C Waste may also be designated as special case waste. L3-01

The Defense Nuclear Facilities Safety Board (DNFSB) charged DOE in DNFSB Recommendation 94-2 that "a comprehensive complex-wide review be made of the low-level waste issue similar to the review the Department conducted regarding spent nuclear fuel," that "a regularized program [be developed] for forecasting future burial needs relative to existing capacity," and that, with regard to this program, "guidance should [be issued to] reflect consideration of concepts of good practices in low-level waste management as applied in the commercial sector." The reference to the commercial sector is understood by inference to refer to the manner in which NRC would regulate such wastes. The DNFSB noted that the DOE directive for waste management invoked "the basic performance objectives of the Nuclear Regulatory Commission's 10 CFR 61." This directive instructs that Greater-Than-Class-C Waste be handled as a "special case" for which a separate EIS could be required for disposal. In the report of the DOE complex-wide review of low-level radioactive waste (LLRW), a commonly reported adverse finding is with regard to the storage or production of "special case waste with no clear path forward to disposal."

Suggesting in the draft EIS that "the most likely options [for disposal of these wastes] are the proposed Yucca Mountain Repository in Nevada, the Hanford Site, the Nevada Test Site, and the SRS" is judged not to be a "clear path forward." Other than at WIPP and ultimately at Yucca Mountain, there are no geologic disposal sites. Vault storage is judged not to be consistent with the standard of commercial practice as expected by the DNFSB, who refers to the vault option as simply storage not disposal. DOE/EM is responsible for setting the disposal requirements for both special case waste and Greater-Than-Class-C Waste.. However, special case waste is not addressed in the DOE/EM Waste Management Programmatic EIS (DOE/EIS-0200-F, May 1997). Section 5.4 of the DOE/EM's Office of Waste Management End State Plan, Initial Draft, February 1996, states the following with regard to Greater-Than-Class-C Waste:

> "The Program Management Plan recognizes that most GTCC [Greater-Than-Class-C] LLW [low-level radioactive waste] is utility activated metals and is similar to the fuel assembly hardware that will be disposed in the high-level waste repository. Since GTCC LLW requires licensed disposal, repository disposal is identified as the option for utility GTCC LLW. Stakeholders review of the Plan supports repository disposal of GTCC LLW."

Based upon the expectations of the DNFSB and the planning of DOE/EM, it is thus most likely that Yucca Mountain licensed disposal is the default primary "clear path forward to disposal" of APT wastes that are classified as either Greater-Than-Class-C Waste or special case waste. The APT EIS should reflect this. L3-02

Finally, the APT Project weekly Updates and monthly Highlights reports on the Los Alamos APT Project homepage indicate that several meetings have been held with the DNFSB in April, November and December 1997. The April report indicated that the DNFSB was to provide review comments on the APT Conceptual Design Report by the end of June 1997. There are no equivalent reports of these meetings among the reports posted on the DNFSB homepage from among either trip reports, technical reports or SRS weekly reports. If the APT Project Office has received guidance from the DNFSB on matters related to waste management or associated radiation safety, such guidance should be reflected in the EIS. It is noted that it is unusual that DNFSB has failed to make public the information received and any comments on that information since the DNFSB enabling legislation does not define an informal consultation role for DNFSB and indicates that all findings except those covered by classification statutes are to be publicly available.. L3-03

Recommendations:

1-1 Section 4.1.5 should be revised to acknowledge that geologic disposal at Yucca Mountain is the primary path forward for APT wastes that fall into the category/classification of being equivalent to or analogous with Greater-Than-Class-C Waste. A detailed plan should be outlined by which such disposal will be achieved. Failure to do so represents a case in which DOE proposes a new project that produces "special case waste with no clear path forward to disposal." This is unacceptable. L3-04

1-2 If DOE/EM plans to continue to distinguish between highly-radioactive regulated waste and highly-radioactive unregulated wastes using the respective terminology for Greater-Than-Class-C Waste and special case waste, both sets of terminology should be introduced into Section 4.1.5 and in the Glossary in Appendix A to the APT EIS. Also in Appendix A, the currently-given Sect B.1 definition of Greater-Than-Class-C Waste should be revised to reflect that the "special disposal considerations" are that geologic disposal is required. L3-05

1-3 A listing of all meetings with non-DOE regulatory authorities should be provided for meetings related to waste management or associated radiation safety. The listing should provide information about date, place, participating organizations, individual participants, subjects discussed, summary of feedbacks or recommendation made, and summary of implementation of such feedbacks or recommendations. Such information will prove helpful to reviewers of the final EIS in assuring that there is a basis for project decisions on waste generation and disposal that is grounded in the regulatory review process. L3-06

2. Environmental and Public Health Hazards from Accidents:

Comment: Section B.1, "Analysis Methodology," Appendix B, "ACCIDENTS," states that the "tungsten neutron source is clad in Inconel, which has a high resistance to oxidation" and that "DOE used a conservative failure temperature of 1,250 [degrees] C in the calculation for this analysis" so that in "scenarios that would involve heating the target/blanket structure, the tubes would remain intact and no release would occur as long as structural temperatures were below 1,250 [degrees] C."

Section B.1 also states that "all the scenarios with the exception of the Beyond-Design-Basis Event described in Section B.2.13 assumed the quick termination of the accelerator beam because the design includes redundant sensors and shutdown systems to detect beam problems and terminate its operation before significant damage could occur."

Section B.2.13 indicates that, for the Beyond-Design-Basis Event with failure to trip the beam, the scenario is both incredible and has a low consequence (namely, limited releases of radioactive material inside the target cavity only). The assessment of the incredibility of occurrence is based on the redundancy and diversity of sensors. The consequence assessment is based upon assuming the failure of the cooling pipes occurs when the target assembly ladder rungs heat up to 1250 degrees C thus causing flooding of the target cavity with primary coolant water that will either activate beam-trip sensors in the cavity or cause moisture to enter the evacuated beam tunnel through an "always open" connecting vent pip again terminating the beam.

It is noted that:

(1) Termination of the beam due to target piping structural failure at 1,250 degrees C is not conservative if the delay to a higher temperature in the target causes higher releases. A higher temperature may be more appropriate if structural analyses are performed using materials data at the other end of the uncertainty range Also the entry of coolant into the target cavity may be delayed or significantly minimized because, in a loss of coolant accident due to failure of external piping, there may be little to no water left to leak in when the ladder fails or because water leaking down the vertical header pipes will cool the metal on the ends of the ladder (but not necessarily the target tungsten) and continue to steam leading to over-pressurizing the primary coolant so that the relief valve fails open allowing water and steam to chug out though the valve. Delayed water flooding of the cavity containing a molten tungsten-Inconel mixture or near molten tungsten mixed with molten Inconel could cause a steam explosion that could release significant quantities of radionuclides and compromise the integrity of the confinement. Such an accident should be either the design basis for the confinement or the basis of the source term for emergency planning consistent with the conservative assumptions under laying 10 CFR 50.47 which specifies emergency planning requirements for commercial nuclear facilities. L3-07

(2) With regard to redundancy of sensors, how many of the sensors used to terminate the beam are either classified as safety-related or constitute the "primary success path" for a technical specification or technical safety requirement? In deterministic accident analysis, the NRC requires that reliance only be given to safety-related items or those subject to technical specifications. Such sensors will have to be on the Quality List and subject to configuration management controls analogous to those for licensed reactors at 10 CFR 50.59. In theory, a target facility blackout of all alternating current and direct current electricity could immobilize all sensors, pumps, and confinement fans. Maintaining configuration management as well as redundancy, diversity, independence and separation of beam shutdown systems is necessary to preclude the impact of target facility blackout not being communicated to the beam control facility in an automatic and effective manner. L3-08

(3) However, although the NRC-approved Standard Technical Specifications list multiple mechanisms to trip a reactor, NRC also requires in the Standard Review Plan at NUREG-0800 that deterministically-defined accident scenarios for reactors must consider consequences of the added failure to insert control rods, that is, the anticipated-transient-without-scram. (ATWS). Failure to trip the beam in accelerators is the functional analogy for ATWS in reactors. The EIS presentation suffers from an optimistic, non-conservative rendition of the ATWS analogy that should be made worse in an accelerator-driven target because accelerator-target systems lack inherent negative power feedbacks that are required in reactors. L3-09

(4) The always open vent pipe between the accelerator beam tunnel and the target cavity will require manual isolation when the target vessel is open to avoid unwarranted in-leakage of volatile materials into the beam tunnel. Technical specifications will be required for any isolation valve and surveillance requirements will have to be imposed to verify that no foreign objects enter the vent pipe during maintenance activities on either end such that the safety function could be defeated. L3-10

(5) At this juncture in the stage of the design for the APT, it is imprudent to base consequence analysis on hypothesized favorable operations of structure, systems and components that do not exist, that have not been classified with regard to importance to safety, and for which no data are provided from experience to defend assumptions. During a presentation on Japan's program for accelerator-driven waste transmutation at the American Nuclear Society 1997 Winter Meeting Embedded Topical Meeting on Nuclear Applications of Accelerator Technologies, Dr. Takehiko Mukaiyama, Director of the Center for Neutron Science at the Japan Atomic Energy Research Institute, presented experiential data comparing the unexpected shutdown frequencies for current accelerators to that for commercial reactors. His presentation indicated that current research accelerators average about 100 inadvertent shutdowns per week whereas commercial reactors experience at most only one or two unanticipated trips per year. His message is that accelerator control and protection systems will have to evolve to an equivalent level of reliability as commercial reactors. Without a detailed design and a supporting experience base, the beyond-design-basis accident for APT should assume the worst possible damage to the target and the events which would maximize dispersion of radioactive materials rather than optimistically diagraming a minimal consequence event by selectively tailoring choices of advantageous assumptions. The draft EIS does not serve the public by being disingenuous about serious safety concerns. L3-11

Recommendations:

2-1 Section B.1 and B.2 should be revised to indicate that equipment relied upon to perform safety functions will be classified as safety-related and subject to both technical safety requirements and configuration management controls. Consistent with NRC's approach to accident analysis, no accounting should be allowed for the actuation of investment protection equipment in the accident analysis unless that actuation in fact worsens the consequences of the accident. Consistent with NRC's treatment of ATWS, the failure to trip the beam should be applied to all events in which cooling is lost to the target both loss of coolant and loss of flow. The treatment of the accident upon which emergency planning is to be based should be as conservative as the NRC assumption underlaying 10 CFR 10.47 (namely, total loss of target integrity and loss of confinement). L3-12

2-2 The accident scenario for the beyond-design-basis event should address both the consequences of the untripped beam (up to 10 minutes) without either flooding or beam shutdown due to ladder failure and the consequences of the untripped beam causing a molten target (up to 10 minutes into the transient) leading to a steam explosion in the target cavity when flooded. L3-13

3. Recommendations based on Other Considerations:

Comment: Section 1.6, "Nonproliferation," raises several issues that go beyond DOE actions. There are both international and interagency implications to the proliferation concern raised by pursuing APT. Section 1.6 asserts that "accelerator technology has been in use for more than 75 years," that "the possibility of producing special nuclear material (i.e., plutonium) using an accelerator was recognized several decades ago," and that the "APT is the first known accelerator proposed for a mission to produce weapons materials in a sustained production operating mode." The section also indicates that using "an accelerator to produce special nuclear materials in quantities which could be a proliferation concern requires a particle beam power of approximately 1 megawatt or greater" and that "research accelerators with beam powers in the 1 megawatt range have been viable for at least 20 years."

The above quotes raise serious issues such as:

(1) As a signatory of the Nonproliferation Treaty, why has the U.S. delayed regulating trade in a device that can be used to produce special nuclear materials as required by Article III(2) of the Treaty? Why would the U.S. propose to construct such a device for producing weapons materials without first assuring that the Treaty obligations are met on both a national and international basis? What are the factors involved in arriving at the current situation- ineptitude on the part of DOE or politics? The public trust appears to be violated by DOE's current actions and overdue lack of mitigating action. DOE's proposal to take a world wide technology that has long been applied to commercial and peaceful missions such as neutron scattering research and medical isotope production and to convert that technology before the eyes of the world for the purpose of fueling nuclear weapons without any export controls or safeguards in place is beyond comprehension. The alleged proliferation risk of using commercial reactors to produce tritium pales before this proposal. L3-14

(2) DOE is not the only agency with responsibility for nonproliferation. DOE regulates the export of information and technology in a broad sense; NRC regulates the export of production and utilization facilities and equipment thereof; the Department of Commerce regulates dual use items. What plan of actions is being taken to coordinate the fall-out of the APT proposal across the U.S. government? L3-15

(3) The U.S. is a member of an international body called the Nuclear Suppliers Group (NSG) composed of signatories of the Nonproliferation Treaty. The guidance formulated by the

NSG on issues of export controls includes the "Trigger List," which triggers safeguards, and the "Dual Use List." The Trigger Lists starts with reactor equipment for a facility that can produce as little as 100 grams of plutonium annually. This has implications for accelerators operating with beam powers much, much less than 1 megawatt. These guidelines and lists are published by the International Atomic Energy Agency (IAEA). What plan of actions is being taken to coordinate the fall-out of the APT proposal internationally? L3-16

Finally, in a somewhat related matter, Section 1.6 states that, in the past, "using [accelerators] for large scale production was more costly than production in nuclear reactors." From the cost analyses of the APT that were not discussed in the upper tier Programmatic EIS for Tritium Supply and Recycling, this appears to be still true today. This needs to be addressed elsewhere in the EIS or in a supplement to the Programmatic EIS. L3-17

Recommendations:

3-1 In Section 1.6 or equivalent in the final EIS, DOE should describe the actions being taken to satisfy proliferation concerns at both the interagency (NRC, Commerce) and international (NSG, IAEA) levels. An independent review of the options for tritium production should be performed by the DOE Office of Nonproliferation and National Security consistent with that performed for the Fissile Materials Disposition Program. These issues should also be elevated for discussion in the Summary of the EIS. L3-18

3-2 The issue of cost impact and comparison to the reactor option should be addressed elsewhere in the EIS or in a supplement to the Programmatic EIS. L3-19

Respectfully submitted,

David L. Moses, Ph.D., P.E.
Nuclear Engineer

RESPONSES TO COMMENTS L3-01 THROUGH L3-06 CONCERNING RADIOACTIVE WASTE CLASSIFICATION AND MANAGEMENT

Response to Comment L3-01 (Dr. David Moses)

The designation of some waste in the Draft APT EIS as Greater-Than-Class-C waste was an oversimplification and not technically accurate. DOE has recently issued Draft DOE Order 435.1, "Radioactive Waste Management," which only contains three waste classifications; high-level waste, transuranic waste, and low-level waste. The previously used term "special case" waste will no longer be valid when the new order is finalized. An evaluation of the more radioactive of APT's waste streams is currently under way to confirm that it can be disposed of at SRS within existing requirements. This evaluation is anticipated to be completed by the end of 1998. However, it should be noted that DOE will not proceed with the generation of waste products without a clear path forward for disposition of the wastes.

Response to Comment L3-02 (Dr. David Moses)

As noted in the response to comment L3-01, DOE is completing an update to the SRS Low-Level Radioactive Waste Performance Assessment and will determine the disposal of all APT wastes after this assessment is completed. As stated above, DOE will not proceed with the generation of waste products without a clear path forward.

Response to Comment L3-03 (Dr. David Moses)

The APT Program has provided the Defense Nuclear Facilities Safety Board (DNFSB) with copies of the APT Conceptual Design and the EIS. In addition, several informational sessions have been held with the staff of the DNFSB to provide additional background information on the APT project and design. The objective of this information is to ensure the DNFSB understands the concepts and the APT design so they can provide the best design and safety review possible. The DOE anticipates that the DNFSB will participate in design reviews of the preliminary and final design and the Preliminary and Final Safety Analysis Reports. However, no formal comments from DNFSB have been received to date. Formal interactions with the Board will be documented.

Response to Comment L3-04 (Dr. David Moses

As noted in the response to comment L3-01, DOE is completing an update to the SRS Low-Level Radioactive Waste Performance Assessment and will determine the disposal of the high concentration or special case wastes after this assessment is completed. However, DOE will not proceed with the generation of any waste without a clear path forward.

Response to Comment L3-05 (Dr. David Moses)

Appropriate modifications have been made to Section 4.1.5 of the Draft EIS (see Part C, page C-49) and the Glossary. The focus of Appendix A of the Draft EIS is SRS facilities and processes. Specific details, including volumes of waste streams, are discussed in Chapter 4 of the Draft EIS.

Response to Comment L3-06 (Dr. David Moses)

As noted in response to comment L3-03, informational meetings have been held with DNFSB. These meetings have included a discussion of the wastes to be generated by the APT and their radiation characteristics. In addition, the treatment, storage, and disposal of radioactive waste is subject to regulatory con-

trol by the South Carolina Department of Health and Environmental Control and the U.S. Environmental Protection Agency (EPA). The APT project has established coordination with these agencies to insure that all regulatory requirements are met.

RESPONSE TO COMMENTS L3-04 THROUGH L3-13 CONCERNING ENVIRONMENTAL AND PUBLIC HEALTH HAZARDS FROM ACCIDENTS

DOE has considered the environmental impacts of pertinent potential APT accidents. Technical issues raised by the author of Letter 3 will be taken into account, as appropriate, as the APT design envelope develops and safety analysis reports are completed.

Response to Comment L3-07 (Dr. David Moses)

Guidance for emergency preparedness activities at DOE facilities is given in DOE Order 151.1. There is no reason to believe that structural failure temperatures of greater than 1250°C would result in any greater consequences than those postulated at 1250°C, as both temperatures are substantially above the normal boiling point of the cooling water. The only accident scenario in which the failure temperature of the cladding comes into consideration is the beyond-design-basis seismic event. In this case, the cladding is assumed to fail at 1250°C and release all of its contents.

Response to Comment L3-08 (Dr. David Moses)

The beam shutdown system is designated safety-class and will be controlled through appropriate technical safety requirements. In addition, the acceleration of the beam is dependent upon the receipt of a feedback signal from the target/blanket facility. Should power be lost to the target/blanket facility, the feedback signal also would be lost, terminating acceleration of the beam.

Response to Comment L3-09 (Dr. David Moses)

There is no functional analogy between an Anticipated Transient Without Scram (ATWS) for a nuclear reactor and a beam trip failure for an accelerator. In a reactor, the nuclear chain reaction is self-sustaining; in an accelerator, the propagation of the beam from origin to target is not. In a reactor, equipment malfunctions could result in the reactor not shutting down; in an accelerator, equipment malfunctions inevitably result in beam shutdown. Because of the potential consequences of a reactor accident, inadvertent reactor shutdowns must be analyzed to determine the cause of the shutdown prior to restart. In accelerators, inadvertent shutdowns as a result of transients are a matter of routine operation, and in most cases an accelerator is automatically restarted in less than 1 second.

A description of a thermalhydraulic transient coincident with the failure to trip the beam is included in Section B.2.13 of Appendix B of the Draft EIS.

Response to Comment L3-10 (Dr. David Moses)

The design of the Target/Blanket Building and Accelerator is evolving and the referenced open vent path may or may not survive as a design element in the final design. Should this vent path be relied upon in the design safety analysis, appropriate administrative controls would be used to ensure the vent path could perform its function.

Response to Comment L3-11 (Dr. David Moses)

It is inappropriate to compare research accelerators that are not necessarily designed for continuous duty with commercial nuclear reactors that are designed to operate in a baseline mode. The design of the accelerator has on-line spare equipment to allow for full operation even with some of the equipment out of service. Section B.2.12 of Appendix B of the Draft EIS describes the assumptions used in the determination of the beyond-design-basis seismic event. While substantial damage is postulated in this beyond-extremely-unlikely event to tritium separation and support facilities at APT, it is not necessary to discount the mitigating effects of the physical form of the hazardous material or postulate a dispersion mechanism where one does not credibly exist. Additionally, the EIS is not the safety design basis document for APT and that applicable DOE guidance will be applied to the design and construction of APT, such that the safety of workers at the public is assumed.

Response to Comment L3-12 (Dr. David Moses)

The beam shutdown system is classified as a safety class system and as such, appropriate technical safety requirements and configuration management controls would be used to ensure the system functioned as designed. The consequences of a thermalhydraulic transient coincident with a failure to trip the accelerator beam is considered in Section B.2.13 of Appendix B of the Draft EIS.

Response to Comment L3-13 (Dr. David Moses)

It is not credible that a beyond-design-basis seismic event that destroys the target/blanket cooling capability would leave the non-seismically-qualified power transmission system and all accelerator components intact and functioning. A seismic event of that magnitude would likely throw the beam out of alignment and thus dissipate the beam before it reached the target/blanket building. The seismic event is the only initiator that could cause the incident described.

RESPONSE TO COMMENTS L3-14 THROUGH L3-19 CONCERNING RECOMMENDATIONS BASED ON OTHER CONSIDERATIONS

Response to Comment L3-14 (Dr. David Moses)

Under the Atomic Energy Act and its implementing regulations, the U.S. Government ensures that its Nonproliferation Treaty Obligations are met. The Atomic Energy Act empowers DOE and the Nuclear Regulatory Commission (NRC) to control exports of technology or services and equipment or facilities for the production, development or utilization of special nuclear material (SNM). To export technology for an accelerator for the production of significant quantities of SNM, the authorization of the Secretary is required under DOE regulations 10 CFR Part 810. To export equipment or facilities specially designed or prepared for an accelerator to produce significant quantities of SNM, an NRC license is required under NRC regulations at 10 CFR Part 110.

Until now DOE control over technology for accelerator production of SNM has been implicit. But to ensure that the public is aware of the restrictions on the transfer of the technology, DOE is in the process of amending its nuclear technology export regulations to explicitly cover accelerator technology for the production of SNM. Also, accelerators for basic scientific research are controlled by the Department of Commerce, and tritium, as well as SNM, is controlled by NRC.

Response to Comments L3-15 (Dr. David Moses); M1-01 (Mr. Peter Gray); and M1-14 (Mr. Ernie Chaput

The Nuclear Non-Proliferation Act of 1978 (NPT) established formal procedures for reviewing nuclear exports and for coordinating U.S. agency positions on the addition of new technologies to the nuclear export control lists. With each change to the nuclear export control lists, DOE initiates a nonproliferation study to consider questions of significance to the nuclear fuel cycle or to nuclear explosive activity, risk of diversion to clandestine programs, foreign availability, and related information of interest. DOE has initiated such a study for accelerator production of SNM. The results of the study will be shared with all agencies and appropriate measures will be taken as called for in the Nuclear Non-Proliferation Act procedures.

Response to Comments L3-16 (Dr. David Moses); M1-01 (Mr. Peter Gray); and M1-14 (Mr. Ernie Chaput

The President's nuclear nonproliferation and export control policy calls for the coordination of all U.S. unilateral export controls with multilateral regimes [e.g. the Nuclear Suppliers Group (NSG) and the NPT Exporters Committee]. Therefore, policy calls for the U.S. to coordinate its views and practices with other nuclear suppliers and within the nuclear export control regimes. In May 1997, the U.S. Government informed its fellow NSG members in a formal briefing of the technical capabilities of using accelerators to produce SNM. Further NSG discussion will take place as necessary.

Response to Comments L3-17 (Dr. David Moses); M1-01 (Mr. Peter Gray); and M1-14 (Mr. Ernie Chaput

The APT EIS was prepared in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality's Regulations on Implementing NEPA (40 CFR Parts 1500 through 1508), and the Department of Energy's NEPA Implementation Procedures (10 CFR Part 1021). None of these require inclusion of a cost analysis in an EIS. The basic objective of this EIS is to provide the public and the Department's decision-makers with a description of the reasonable alternatives and their potential environmental impacts. While costs could be an important factor in the Department's decision regarding the production of tritium, the focus of an EIS is on the environmental consequences. Cost estimates for both the APT and the Commercial Light Water Reactor (CLWR) are refined as new information is developed. In December, 1998, total life cycle costs for the APT ranged from $7.5B to $9.2B. CLWR total life cycle costs ranged from $1.1B to $3.6B.

Response to Comments L3-18 (Dr. David Moses); M1-01 (Mr. Peter Gray); and M1-14 (Mr. Ernie Chaput

On July 14, 1998, a high-level government task force issued to Congress a report "Interagency Review of Nonproliferation Implications of Alternative Tritium Production Technologies Under Consideration by the Department of Energy". This report, conducted by top Administration officials from various Departments, including the Department of Defense, the Department of State, and the Department of Energy, concluded that the APT project does not pose proliferation risks. It also concluded that any nonproliferation issues associated with the use of a CLWR to produce tritium were manageable and that DOE should continue to pursue the CLWR option. The review further concluded that there are no legal or treaty prohibitions against tritium production in a CLWR, reactors making tritium could remain on the IAEA Safeguards List, and that no bilateral "peaceful uses" agreements would be violated. This report is available upon request. In addition, the commentors are directed to the CLWR EIS (DOE/EIS-0288) for additional information regarding the nonproliferation issues associated with tritium production in a CLWR.

Response to Comment L3-19 (Dr. David Moses)

The APT EIS was prepared in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality's Regulations on Implementing NEPA (40 CFR Parts 1500 through 1508), and the Department of Energy's NEPA Implementation Procedures (10 CFR Part 1021). None of these require inclusion of a cost analysis in an EIS. The basic objective of this EIS is to provide the public and the Department's decision-makers with a description of the reasonable alternatives and their potential environmental impacts. While costs could be an important factor in the Department's decision regarding the production of tritium, the focus of an EIS is on the environmental consequences. Cost estimates for both the APT and the Commercial Light Water Reactor (CLWR) are refined as new information is developed. In December, 1998, total life cycle costs for the APT ranged from $7.5B to $9.2B. CLWR total life cycle costs ranged from $1.1B to $3.6B.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW
ATLANTA, GEORGIA 30303-8909

February 9, 1998

Mr. Andrew R. Grainger
Savannah River NEPA Compliance Officer
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A, Code APT
Building 773-42A, Room 212
Aiken, SC 29808

RE: EPA Review of Draft Environmental Impact Statement (DEIS)
Accelerator Production of Tritium at the Savannah River Site

Dear Mr. Grainger:

Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has reviewed the subject Draft Environmental Impact Statement (DEIS). The document provides information to educate the public regarding general and project-specific environmental impacts and analysis procedures. We appreciate your consistency with the public review and disclosure aspects of the NEPA process. We also note that the Department of Energy (DOE) held a meeting on January 13, 1998, to receive comments from the public.

DOE proposes to build and operate a linear accelerator to produce tritium, a gaseous radioactive isotope of hydrogen, and component in the operation of weapons in the nation's nuclear arsenal. This EIS is linked to the *DOE Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling* (October 1995). DOE determined that it will produce tritium either in an accelerator as described in this EIS (at the preferred or alternate location at SRS), or in a commercial reactor, as described in a separate EIS.

Based on our review, we rate this DEIS "EC-2", that is, we have environmental concerns about the proposed project, and more information is needed to fully assess the impacts. In particular, groundwater and surface water impact mitigation warrant further discussion in the Final EIS (FEIS).

Thank you for the opportunity to comment on this project. If you have any questions or require technical assistance you may contact Ramona McConney of my staff at (404) 562-9615.

Sincerely,

for Gerald T. Miller

Heinz J. Mueller, Chief
Office of Environmental Assessment

Attachment

EPA Comments on Proposed
Accelerator Production of Tritium at the Savannah River Site
(DEIS December 1997)

General Comments

The DEIS is a well-organized document that clearly describes the proposed action and alternatives. Generally, the Accelerator Production of Tritium (APT) technology generates less radioactive and other wastes than alternative methods of tritium production. While EPA recognizes the advantages of APT technology, we also see the potential downside of placing this type of facility at SRS. The proposed project would have varied effects upon natural resources at SRS. EPA is concerned about issues regarding loss and alteration of wetlands and surface water bodies. Other issues of concern include the potential for groundwater flow changes, depletion of aquifers, and creation of radioactive material in groundwater as a result of neutron activation.

The need for excavation, construction, and dewatering to support the APT technology, as well as cooling towers, may lead to alteration of natural surface water and groundwater flow. The proposed site would need rigorous monitoring to ensure that there is no potential for significant migration of contaminants. Stringent preventative measures, monitoring, and mitigative planning will be required for this activity at SRS, to prevent contamination of soils, groundwater, and surface water. Further details about these activities should be included in the FEIS. L4-01

Potential environmental impacts include the discharge of heated wastewater, with non-radioactive constituents, to onsite surface water bodies that empty into the Savannah River. The DEIS also states that removal of large volumes of water from the Savannah River could change its present condition, particularly under the Once-Through Cooling Water alternative scenario. Page 6-1 states that this alternative would cause loss of wetlands and adverse impacts on the aquatic ecosystem, due to increased flow and the rise of water level. The preferred alternative of mechanical-draft cooling towers would have less dramatic impact on wetlands and surface water.

Section 4.3.5, Environmental Justice, examines whether minorities or low-income communities could receive disproportionately high and adverse human health and environmental impacts. DOE states in this section that they expect little or no adverse health impacts from any of the alternatives. Potential noise impacts, and impacts on aesthetic settings in the SRS vicinity, are addressed in Section 3.3.7 of the DEIS.

Although the DEIS contains information regarding estimated power plant emissions, it does not specifically describe the proposed action's cumulative impact on global climate change. If fossil fuels are used as a power source for this technology, would there be a significant impact on global warming? L4-02

Technology Comments

This DEIS does not address in adequate detail how waste and activation products generated as a result of operations to produce tritium will be handled. For example, on pages 4-4 and 4-5 it is stated that some neutrons could penetrate the accelerator shielding and be available for absorption by stable atoms in the soil and groundwater to form radioactive atoms that groundwater could transport off-site. There is additional text that says the groundwater standard of 4 millirem will not be exceeded. However, there is no mention of the activation products that will be formed in soil and their likely concentrations, solubility and other properties. L4-03

The operational definition of high concentration radioactive waste that appears on page 4-25 of this document does not stand alone and is ambiguous. The definition reads "the classification of radioactive wastes is based on the concentration of short- and long-lived radionuclides. High concentration wastes contain long-lived radionuclides. Classes A and B include radioactive wastes with concentrations of short-lived and perhaps some long-lived radionuclides." This definition is less than adequate. DOE should use definitions consistent with those found in 10CFR part 61 or other appropriate sections which refer to various radioactive waste classifications. The Applicable or Relevant and Appropriate Requirements (ARARs); from which definitions of radioactive wastes comes, are found in part 10 of the CFRs. There are no definitions in the glossary of Class A, B, or C wastes. Additionally, many of the definitions in the glossary are less than adequate. L4-04

A 30-year projected low-level waste volume of 42,000 cubic meters was presented in this document. However, an explanation of how this number was determined is not apparent. Were other similarly designed accelerators with an operating history surveyed to get an idea of how much waste could be generated over this period of time? L4-05

The document states that primarily low level radioactive and mixed wastes are being generated. However, page A-38 of Appendix A states that some failed or spent APT components could require "special casks" to meet transportation and disposal requirements because of "higher levels of radioactivity". If this reference is to so-called "high concentration wastes", it should be clearly stated in the FEIS. L4-06

Response to Comment L4-01 (U.S. Environmental Protection Agency)

See response to comment L2-01. DOE is committed to performing appropriate mitigating measures, including the possible installation of monitoring wells.

Response to Comment L4-02 (U.S. Environmental Protection Agency)

See response to comments M1-03 and M1-10.

Response to Comment L4-03 (U.S. Environmental Protection Agency)

The Department has clarified the discussion of activation products in modifications to Chapter 4 (see Part C, page C-42). The dominant activation product would be tritium. Also, please see the response to comment L2-01.

Response to Comment L4-04 (U.S. Environmental Protection Agency)

The commenter is correct that technical definitions can be found in 10 CFR Part 61. The Department has attempted to simplify this discussion to help understanding among the widest range of stakeholders. Modification to the text box on page 4-25 of the Draft EIS (see Part C, page C-49 of this document) has been made.

Response to Comment L4-05 (U.S. Environmental Protection Agency)

The projected low-level radioactive waste (LLW) volume for APT is based upon the Pollution Prevention Design Assessment for the Project (England et al., 1997, *Accelerator Production of Tritium*, Pollution Prevention Design Assessment, WSRC-TR-97-02-60, Westinghouse Savannah River Company, Aiken, South Carolina). This document analyzes all of the potential waste streams for APT and identifies methods and materials that could reduce the amount of waste. The largest components of the estimated 1,400 cubic meters of LLW are job control waste and non-hazardous process equipment. These estimates are based upon the design of the facility and expected waste generation rates.

Response to Comment L4-06 (U.S. Environmental Protection Agency)

The reference is not exclusively to high concentration wastes. The statement in Appendix A of the Draft EIS indicates that some waste streams may require extra shielding during their transportation as the intrinsic radioactivity would be high.

Date: 2/10/98 10:28 AM
Priority: Normal
BCC: NEPA at SRCCA02
TO: nepa at Mailhub
CC: TAYLORGK
CORNETPA
Subject: Comments

I would like to submit the following comments/ questions for consideration:

1) I would suggest that both tritium supply alternative EISs be evaluated and compared before a decision is made on the method of supply. L5-01

2) For cooling water it is indicated that groundwater is not available in sufficient capactity to supply all of the cooling water. I would like to suggest that it be evaluated if the recovery and reinjection of tritiated groundwater be considered for a source of cooling water. If this could be used as a portion of the cooling water supply it may be worth while to consider as it could increase recovery of the tritiated groundwater, be used for a purpose and then be reinjected and hopefully reduce the levels of tritium in the Savannah River which is used for drinking water supply. L5-02

Thanks
Russell Berry
SCDHEC, Low Country EQC

Response to Comment L5-01 (Mr. Russell Berry)

See response to comment L1-02.

Response to Comment L5-02 (Mr. Russell Berry)

The Department does not believe it would be feasible to utilize tritiated water as a cooling source for the APT because of the excessive amounts of other contaminants in the water. Since discharge of water is required to keep salts from accumulating in the cooling lines, the use of tritiated water might result in more tritium being introduced into the environment. The Department is, however, investigating the possibility of using tritiated water for other purposes.

realname: David Moses

email: mosesa@aol.com

subject: ES&H regulatory questions on accelerators

telephone: 423-483-4300

comments: I follow the APT EIS process and I will follow the soon to emerge SNS EIS process. From the former, several questions and comments arise about DOE's regulatory process. These questions/comments are as follows:

o If APT were a reactor and not an accelerator-driven target, its radioactive inventory of spallation and activation products that is apparently equivalent to the fission product inventory in a 50 MWth reactor would make it a Hazard Category 1 facility under DOE 5480.30, but APT at the conceptual design and for purposes of the ROD apparently is classified only as a Hazard Category 2 facility. this seems to fly in the face of DNFSB recommendation 95-2 with regard to consistent application of standards based on the hazard posed.

L6-01

o If APT were a reactor and not an accelerator-driven target, its would be required to have "safety-related" protection and engineered safety systems under DOE 5480.30 and to address anticpated transients without scram (ATWS) to meet the criteria for hazards analyses in Sects. 6 and 8.c of DOE 5480.23, but APT documents never mention "safety-related" systems including beam-trip, and apparently the APT project does not want to consider failure to trip the beam in the same conservative fashion as ATWS is considered in a reactor. Isn't the beam a source of energy that, as required to be considered in hazard analyses under DOE 5480.23, can lead to target failure the same as an unprotected/unmitigated reactivity excursion in a reactor? DOE 5480.23 and DOE-STD-1027 indicate that hazards analyses should not consider mitigation systems in making the hazard classification determination, but APT apparently always assumess beam trip for such determinations. Can't the reflood of a molten target be a potential source of steam explosion the same as the reflood of a molten reactor depending upon materials and temperatures? Reactors also are required to have inherent negative feedbacks per DOE 5480.30 but not targets for accelerators such as that in APT. Again, DOE does not appear to be taking DNFSB Recommendation 95-2 very seriously.

L6-02

o If APT were a reactor and not an accelerator-driven target, its radiaoctive wastes from the core would be "high-level" and destined for the geologic repository for disposal, but, although just as radioactive as Greater-than- Class-C LLRW that NRC and DOE/EM indicate must go to the repository, APT wastes are per the APT Homepage reportedly destined for shallow land land disposal at SRS. This seems to be inconsistent with the thrust of DNFSB Recommendation 94-2 and the complex-wide review of LLRW that followed its issuance. In fact since legally APT wastes may not be classfied readily as Great-than-Class-C (although just a radioactive), under DOE/EM guidance, they appear to be special case waste and inherently hazardous special waste wherew the complex wide review found that the production or storage of special case waste with no clear path forward is a major concern at many sites. DOE seems to be playing word games - not calling APT wastes specail case while calling such wastes Greater-than-Class-C in the recent draft APT EIS for siting at SRS and then reporting that the stuff is being considered for disposal on site at SRS.

L6-03

Response to Comment L6-01 (Dr. David Moses)

DOE-STD-1027 lists the radionuclide inventory necessary for the initial categorization of a facility as either category 1, 2, or 3. While many of the radionuclides that would be present at APT are not specifically listed, the standard makes provision for the evaluation of unlisted radionuclides and provides default values to be used. In addition, the requirement for performing a detailed safety analysis for the facility is not diminished by the initial hazard classification.

Response to Comment L6-02 (Dr. David Moses)

See responses to L3-08 and L3-09.

Response to Comment L6-03 (Dr. David Moses)

See response to L3-01.

Additional DOE response is provided in the following letter from Dr. Paul Lisowsky.

Los Alamos
NATIONAL LABORATORY

Accelerator Production of Tritium Project Office
P. O. Box 1663, MS H813
Los Alamos, New Mexico 87545
Phone: (505) 665-5523 Fax: (505) 667-4344

Date: July 14, 1998
Reference: APT/PDO-98-059

Dr. David Moses
Oak Ridge National Laboratory
Bethel Valley Road
Oak Ridge, TN 37831

Dear Dr. Moses:

I am responding to the email message you sent to DOE headquarters on April 22, 1998, in which you asked three ES&H-related questions about APT. In order to ensure accurate and consistent responses to your questions, the DOE forwarded them to the APT National Project Director's Office here at Los Alamos. Our responses to your questions are attached.

Because APT Project Members have been directed to forward any future questions you might have to my Office, in order to ensure the responses are consistent and correct, you may wish to submit them directly to my office. We appreciate the acute interest you have in the APT and other accelerator projects and will try to be responsive.

I am taking the liberty of copying your management at Oak Ridge National Laboratory in this response. You indicated in your message to the DOE that you expected to raise questions regarding the Spallation Neutron Source project that will be ramping up next year. If possible, we like to be copied (for our records) on your interactions regarding the SNS.

Thank you for your continuing interest in the APT Project.

Sincerely,

Paul W. Lisowski

Paul W. Lisowski
APT National Project Director

Encl.: a/s

Cc: Dr. William R. Appleton, ORNL, SNS
Dr. William P. Bishop, DOE/DP-61
Dr. Gordon Michaels, ORNL
APT/PDO Project Files

Question/Comment:

If APT were a reactor and not an accelerator-driven target, its radioactive inventory of spallation and activation products that is apparently equivalent to the fission product inventory in a 50 MWth reactor would make it a Hazard Category 1 facility under DOE 5480.30, but APT at the conceptual design and for purposes of the ROD apparently is classified only as a Hazard Category 2 facility. This seems to fly in the face of DNFSB recommendation 95-2 with regard to consistent application of standards based on the hazard posed.

Response:

APT is categorized for hazard and safety analysis purposes in full compliance with the appropriate DOE Orders and Standards. DOE disagrees with the initial context of the comment; that is, given the clear and well-documented differences between the APT accelerator and target/blanket, versus a reactor facility, it is not relevant to apply DOE nuclear reactor safety standards such as DOE Order 5480.30 to the APT Facility. The APT Facility is properly categorized according to the requirements of DOE Orders 5480.23 (the principal nuclear safety Order for non-reactor nuclear facilities) and DOE Order 5480.25 (the principal safety Order for accelerators). Both of these Orders require that hazard categorization be conducted in accordance with DOE Standard DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports." The APT facility is properly categorized in accordance with DOE-STD-1027-92. More specifically, the accelerator portion of APT is a "below Hazard Category 3" facility segment, the target/blanket and tritium separation facility portions are "Hazard Category 2" facility segments, and the high-power beam stop portion of APT is a "Hazard Category 3" facility segment. Each independent facility segment has been categorized based on a maximum-credible release of the entire radionuclide inventory present.

DOE disagrees strongly with the comments dealing with the program's adherence to DNFSB Recommendation 95-2. The hazard categorization process used in the APT Program, which has been in place for more than two years, is fully responsive to DNFSB Recommendation 95-2 with respect to a hazards-based approach to the application of standards. Our hazard categorization process has been reviewed by DNFSB on several occasions and has received their concurrence.

Question/Comment:

If APT were a reactor and not an accelerator-driven target, its would be required to have "safety-related" protection and engineered safety systems under DOE 5480.30 and to address anticipated transients without scram (ATWS) to meet the criteria for hazards analyses in Sects. 6 and 8.c of DOE 5480.23, but APT documents never mention "safety-related" systems including beam-trip, and apparently the APT project does not want to consider failure to trip the beam in the same conservative fashion as ATWS is considered in a reactor. Isn't the beam a source of energy that, as required to be considered in hazard analyses under DOE 5480.23, can lead to target failure the same as an unprotected/ unmitigated reactivity excursion in a reactor? DOE 5480.23 and DOE-STD-1027 indicate that hazards analyses should not consider mitigation systems in making the hazard classification determination, but APT apparently always assumes beam trip for such determinations. Can't the reflood of a molten target be a potential source of steam explosion the same as the reflood of a molten reactor depending upon materials and temperatures? Reactors also are required to have inherent negative feedbacks per DOE 5480.30 but not targets for accelerators such as that in APT. Again, DOE does not appear to be taking DNFSB Recommendation 95-2 very seriously.

Response:

APT is categorized for hazard and safety analysis purposes in full compliance with the appropriate DOE Orders and Standards, as they apply to non-reactor nuclear facilities. These orders implement a hazards-based approach to facility safety in which the first step is to identify the hazards. And the second step is to perform accident analysis to show that DOE safety requirements are met. APT has completed a hazards analysis and is now performing the accident analyses. The results of the accident analyses are that for all of the design basis accidents the APT releases are negligible. In the process of doing these analyses the "failure to trip the beam" is considered as an unmitigated event. In the analysis it is subsequently shown that the initiating event is mitigated assuming the worst case single failure in the mitigation system. The beam shutdown system is designated a Safety Class system and will be built with the same rigor as a reactor protection system. For reactors a class of accidents known as Anticipated Transients Without Scram (ATWS) are analyzed. One of the reasons these accidents are analyzed is because reactors have only one shutdown mechanism and that is to insert the control rods. Poisons can be put in but they are to slow to interrupt a transient. In an accelerator there are dozens of ways it can be shut down so the shut down systems are highly reliable. In the reactor ATWS it is the reliability of the mechanical shutdown mechanisms that cause the concern. The detection elements can be made as reliable as necessary through the use of redundancy. This is not true for the final shutdown element. In APT, we will have reliability in the detection system comparable to equivalent systems

in reactors, but because we have multiple ways of executing the final shutdown we will have much higher reliability.

The question alleges that DOE is not taking serious the requirements of DNFSB Recommendation 95-2. This recommendation requires the implementation of Integrated Safety Management. According to the recommendation assessment of the hazards is a key step in this process. APT has done this. In addition, APT has presented its safety implementation plans to the DNFSB, where they commented that we clearly showed that we were implementing the ISM process required by Recommendation 95-2.

The orders for reactors require them to have negative feedback because it has long been recognized that positive feed back in reactors can be catastrophic, e.g., the Chernobyl-4 accident in 1986. The concept of "inherent negative feedbacks" in the APT target does not make sense technically, as the target does not contain uranium, plutonium, or any of the other materials that make reactivity control a safety issue in nuclear reactors.

The possibility of an energetic melt-water interaction (also known as an energetic steam
explosion) in the APT target under conditions analogous to an ATWS event in a reactor has
been considered in APT safety analyses. The only remotely plausible way that an energetic melt-water interaction might occur in the APT target would be for the supply of coolant to the target to be interrupted while the beam diagnostic and beam shutdown systems failed to terminate the beam. Due to the reliability of the systems involved, this would be an incredible event. If this unprotected transient continued, the target would boil off all the available coolant and the tungsten targets within the 12 ladders would overheat. While still at full power, the target cylinders (tungsten clad in Inconel-718) in the first six ladders would heat up at rates ranging from 250 C/s to 400 C/s. The downstream ladders would heat up at slower rates, from 150 C/s for ladder 7, to 50 C/s for ladder 12. The outer structure of the rungs would heat up slower than the targets. These staggered heat-up rates and the disconnected spatial distribution of the Inconel throughout so many rungs and internal flow channels would make any potential melt-water interaction both temporally and spatially incoherent, conditions that have proven unfavorable for energetic explosive interactions in large-scale experiments. It is clear that APT is to a large degree immune to such events as a result of inherent features such as design and materials.

Question/Comment:

If APT were a reactor and not an accelerator-driven target, its radioactive wastes from the core would be "high-level" and destined for the geologic repository for disposal, but, although just as radioactive as Greater-than- Class-C LLRW that NRC and DOE/EM indicate must go to the repository, APT wastes are per the APT Homepage reportedly destined for shallow land disposal at SRS. This seems to be inconsistent with the thrust of DNFSB Recommendation 94-2 and the complex-wide review of LLRW that followed its issuance. In fact since legally APT wastes may not be classified readily as Great-than-Class-C (although just a radioactive), under DOE/EM guidance, they appear to be special case waste and inherently hazardous special waste where the complex wide review found that the production or storage of special case waste with no clear path forward is a major concern at many sites. DOE seems to be playing word games -- not calling APT wastes special case while calling such wastes Greater-than-Class-C in the recent draft APT EIS for siting at SRS and then reporting that the stuff is being considered for disposal on site at SRS.

The Greater-than-Class-C classification (a NRC term) does not preclude disposal at SRS. The current DOE Waste Management Order, DOE 5820.2A, requires a "special performance assessment" for disposal of wastes that exceed the NRC Greater Than Class C (GTCC) classification. Waste streams were classified in the draft APT EIS in error as "Greater-than-Class-C" (being corrected in the final APT EIS). The true classification would be "special case waste" under the current order. DOE is now revising this Order. The revised Order, DOE 435.1, is not expected to retain the treatment of Greater-than-Class-C waste as a special case.

Under the new DOE Order, Low Level Waste disposal limits are based on the results of a disposal site specific Performance Assessment (PA) which sets Curies per cubic meter per radionuclide limits for that particular location. APT is currently funding an update of the SRS Low Level Waste (LLW) disposal site PA for the spallation sources expected to be generated by APT. APT is preparing plans for alternate disposal locations and options to be considered should the revised PA determine that disposal in the SRS LLRW vaults is not technically feasible.

The results are expected to be complete by the end of FY 98. Results are expected to show that few, if any, APT wastes will be unacceptable for disposal at SRS.

Note: The following was submitted during the comment period for the Tritium Extraction Facility EIS. It is reproduced here because there were some comments related to APT.

130 Clemson Drive
Oak Ridge, Tennessee 37830-7664
Electronic Mail: mosesa@aol.com
June 2, 1998

Andrew R. Grainger
NEPA Compliance Officer
SR Operations Office
Building 773-42A, Room 212
Aiken, SC 29808

Dear Mr. Grainger:

Ref: My letter to you with comments and recommendations on the draft EIS for the APT at SRS, February 2, 1998.

The following comments and recommendations are submitted on the Draft EIS for the Tritium Extraction Facility (TEF) at SRS:

1. Designation of TEF as a Department of Energy defense nuclear facility:

Comment: As described in the enabling legislation for the Defense Nuclear Facility Safety Board (DNFSB), as codified in Title 42 of the *United States Code* (USC) and specifically at 42 USC 2286a, the functions of the DNFSB are restricted to and focused on assuring the safety at each existing or new "Department of Energy defense nuclear facility."

As described in activity reports issued by the DNFSB, where such reports can be found and retrieved on the Internet either on the DNFSB homepage (http://www.dnfsb.gov/trip.html) or in the archives of the DOE Departmental Representative to the DNFSB (http://dr.tis.doe.gov/archive/default.htm), the DNFSB has taken an active role in reviewing the safety of operations at existing DOE tritium facilities at both Mound and Savannah River. As also reported both by the Accelerator Production of Tritium (APT) Project in its monthly and weekly reports on the project homepage (http://apt.lanl.gov/) and by the DNFSB SRS Representatives 1998 Weekly Activities Reports (http://www.dnfsb.gov/weekly/sr/sr1998.htm), the DNFSB staff is also taking an active role in reviewing the conceptual design of the proposed APT. These activities by the DNFSB are noted to be prudent and appropriate in assuring the independent oversight of the health and safety both of workers involved in nuclear materials activities at DOE tritium facilities and of the public who may be living in areas near DOE tritium facilities. DNFSB's active oversight of these DOE nuclear activities is to be praised and must continue as the public expects and apparently as Congress intended.

Unfortunately, such actions by the DNFSB appear to have no legal basis since the definition for a "Department of Energy defense nuclear facility" as given in 42 USC 2286g restricts the term to apply to a production facility or utilization facility as defined in 42 USC 2014 or to a DOE-owned nuclear waste storage facility that is not otherwise regulated. Since the definitions for a production facility and a utilization facility at 42 USC 2014(v) and (cc) are restricted to facilities that use, produce, or process "special nuclear material" (SNM) and since tritium is not designated to be

SNM, legally the DNFSB has no current authority from Congress for reviewing the APT or the TEF. For purposes of planning work force restructuring and tracking worker exposures at Mound and SRS tritium facilities, certain DOE tritium facilities at these two sites had to be specially and individually designated as "Department of Energy defense nuclear facilities" in the Defense Authorization Act of 1993 as codified at 42 USC 7274j, but this restrictive definition does not apply to DNFSB safety oversight functions at these tritium facilities.

It is noted that, in reference to its own regulatory functions for emergency planning and response under the *Atomic Energy Act of 1954*, as amended, as given in Sect. 7.2.2 (p. 7-8) of the draft TEF EIS, DOE alludes to the issue of tritium not being a SNM; however, DOE's presentation of its statutory authority is a bit confusing as given in the draft EIS and lacks a specific reference to a document in which "DOE has determined...that DOE regulations apply to tritium-related activities." It is assumed that the unspecified reference is not an interpretation of "Section 57(b) of the Act," that is, 42 USC 2077(b), as cited by DOE in the discussion in the draft EIS, but rather the unprovided reference is to the DOE General Counsel's interpretation of 42 USC 2201(I)(3) as given at Sect. B.1, *Federal Register, 61*, pp. 4209-4910, February 5, 1996, where it is stated that "the requirements in [10 *CFR*] Parts 830 and 835 cover all activities under DOE's auspices with the potential to cause radiological harm." 42 USC 2201(i)(3) has nothing to do with SNM but does provide DOE with broad regulatory authority, which DOE uses to claim exemption from regulation by outside regulators such as the Occupational Safety and Health Administration (OSHA), to "prescribe such regulations or orders as it may deem necessary...to govern any activity authorized pursuant to this chapter, including standards and restrictions governing the design, location, and operation of facilities used in the conduct of such activity, in order to protect health and to minimize danger to life or property." Unfortunately Congress was not equally generous in equivalently granting similar authority to the DNFSB, which unlike DOE remains legally constrained by tritium not being determined to be an SNM or by the definition at 42 USC 2286g not being expanded to cover tritium facilities.

Thus, this situation raises serious questions as to the efficacy of the DNFSB's oversight at DOE tritium facilities, since DOE or its contractors can apparently halt or suborn any investigation or review of a tritium facility with legal impunity, and of DOE's ability to impose civil penalties for violations of DOE safety requirements that may be uncovered by DNFSB's "illegal" investigations or reviews. How can a contractor or contractor employee be held liable for violations discovered in a tainted investigation? Petty criminals are protected against illegal searches and seizures by law enforcement officers that are prohibited from introducing illegally-obtained evidence in courts of law. Can a DOE civil penalty withstand a challenge in Federal court if the law is violated or exceeded in uncovering an alleged offense?

This situation begs to be corrected either by DOE and DNFSB jointly seeking Congressional action to rectify the legal shortfall before it gets tested in an embarrassing or dangerous precedent or by DOE taking appropriate actions already authorized by law. The two alternatives that could be used to rectify this situation are (1) to have Congress revise the definition of "Department of Energy defense nuclear facility" at 42 USC 2286g in the DNFSB enabling legislation to include all DOE tritium facilities that are used for defense purposes or (2) to make the determination that tritium is SNM under the existing authority at 42 USC 2071. A broader version of the first option would be to expand the definition of "Department of Energy defense nuclear facility" at 42 USC 2286g to include all defense nuclear facilities that are regulated by DOE pursuant to 42 USC 2201(i)(3) or other pertinent law. The second option requires both Presidential assent and an opportunity for the Congressional Energy Committees to express dissent. Otherwise if the DOE and DNFSB General

Counsels have a consensus reason to believe that there is already a legal basis for DNFSB oversight of DOE tritium facilities, such a finding should be published jointly in the *Federal Register* so that the public and the DOE contractors can readily understand why further action is not necessary when reading the current law as written implies otherwise.

Recommendation: The Final EIS for the TEF and, for that matter, the Final EIS for the APT at SRS should include a detailed description of the actions that DOE proposes to take to assure that the TEF and the APT are each legally designated to be a "Department of Energy defense nuclear facility." Failure to mitigate this situation and to explain to the public how the situation will be mitigated would be irresponsible. DOE should not proceed with the preliminary design of the TEF or APT until this situation is rectified so that the public can be assured that timely design reviews under 42 USC 2286a for considering safety issues are being performed properly and without question of the legality of the independent safety oversight. DOE should also provide precise descriptive discussions of and clear references to documented determinations such as the one alluded to in Sect. 7.2.2 (p. 7-8) of the draft TEF EIS. TEF-01

2. Need for DNFSB review of the EIS sections on TEF accident analysis and waste management and of the accident analysis documented in Appendix B of the TEF EIS:

In the licensing of commercial production or utilization facilities under the *Atomic Energy Act of 1954*, as amended, the U.S. Nuclear Regulatory Commission (NRC) does not begin the EIS process until the applicant submits the license application, which contains both the preliminary safety analysis report (PSAR) and the environmental report, for NRC staff review. Thus, for licensed commercial nuclear facilities, the preliminary or final EIS is issued contemporaneously with NRC issuing the preliminary or final safety evaluation of the respective PSAR or final safety analysis report (FSAR). Therefore, consistent with the level of license being issued for a commercial nuclear facility, that is, either a construction permit or an operating license, an equivalently mature safety analysis report and its independent safety evaluation exist to support and supplement the EIS. However, as can be noted in the DOE EIS process for the TEF and the APT, the DOE EIS precedes the completion of the PSAR and the performance of any independent review or evaluation of the existing safety analysis documentation.

So while the NRC EIS is two step and is ultimately based on simultaneous NRC reviews of a mature safety analysis and a mature design basis, the DOE EIS process for its new nuclear facilities may be associated with little more than a cursory and internal safety assessment of an immature pre-conceptual or point design subject to no independent review and evaluation. DOE has made no attempt to correlate its EIS responsibilities under the *National Environmental Policy Act* as regulated upon DOE itself at 10 CFR Part 1021 either with its own nuclear safety oversight functions under 48 USC 2201(i)(3) and 2282a as regulated on its contractors at 10 CFR Parts 820 and 830 or with the DNFSB's independent oversight functions chartered by Congress at 42 USC 2286a. Included in DNFSB's legal mandate, subject of course to the restrictive definition at 42 USC 4486g , are the functions to "review the design of a new Department of Energy defense nuclear facility before construction of such facility begins and [to] recommend to the Secretary, within a reasonable time, such modifications of the design as the Board considers necessary to ensure adequate protection of public health and safety" and "in making its recommendations...[to] consider the technical and economic feasibility of implementing the recommended measures." As most experts in design and construction recognize, the early identification of problems leads to the most technically satisfactory and cost effective solutions. The EIS should be an integral part of a

timely and economic assurance of "adequate protection of public health and safety," which is a key function of the DNFSB review process.

DOE's internal review process for recent EISs raises serious questions in this commenter's mind as to the adequacy of such reviews. DOE's current approach to issuing an EIS allows unbridled promotion and marketing by its own staff and contractors without a prescribed outside objective review by technical and safety experts.

When this commenter previously reviewed and commented on the Programmatic EIS for Tritium Supply and Recycle, numerous examples were noted where the internal review process apparently failed to address obvious health and safety regulatory issues especially for the APT option, and, as noted in the above-cited reference set of comments on the draft EIS for the APT at SRS, many of these issues were still not resolved as of a few months ago. In the past, this commenter has made inquires informally to DOE's cognizant nuclear safety enforcement and investigative staff with regard to their roles in reviewing EISs. These inquiries revealed that staff management in DOE's Office of Environment, Safety and Health (DOE/EH) routinely signed off on an EIS without a detailed review by the DOE/EH enforcement and investigative staff because such reviews were reportedly found to delay the process by raising technical or safety questions and thus prevented the obtaining of financial incentive bonuses by DOE managers for their timely processing of EIS paperwork. It is also apparent that DOE's Office of Environmental Management (DOE/EM) has had little or no impact on the Programmatic EIS for Tritium Supply and Recycle since APT's hottest radioactive wastes were characterized in that document as "routine low-level or mixed radioactive wastes" when under DOE/EM's guidance documents these wastes should have been characterized as "special case wastes" or "inherently hazardous special wastes." Similarly, the classification of these wastes as Greater-than-Class-C in the draft EIS for the APT at SRS, while more appropriate, is still inconsistent with both Federal law and the DOE/EM guidance documents for such wastes. One questions why DOE/EM bothers publishing guidance documents and policy statements on waste classifications since DOE staff and contractors apparently ignore them as evidenced by the recent record of EISs; this should be a matter of some interest to DNFSB, which is charged with oversight of DOE's implementation of standards. Similarly, the DOE Office of General Counsel apparently does not review the EISs since obvious statutory and regulatory issues such as those raised previously for the APT were not addressed. Perhaps, this is evidence of a lack of cognizant staff review or possibly of the provision of inadequate time for a detailed review by cognizant and knowledgeable staff since it is understood from at least one senior DOE manager in the DOE Office of Fissile Material Disposition that his office was given less than a day to review and sign off on the three volumes of the Programmatic EIS for Tritium Supply and Recycle. It appears that the velocity of DOE's internal review process for an EIS is more important than the validation of its veracity. If my understanding and description of this situation is indeed still a correct characterization, the need for an independent review of the waste management and safety assessments is true for the TEF draft EIS as well as also for other recent EISs, but my current focus is on the draft EIS for the TEF.

The situation described above can be rectified by requesting a DNFSB review of the TEF draft EIS waste management and accident analysis documentation and then publishing the results of the DNFSB review within the Final EIS. Even if that result is nothing more than a list of unanswered questions, it is important that the public know what the questions by the independent safety reviewer are and how DOE intends to address the questions. Such actions will go a long way toward making the DOE EIS process for a new nuclear facility more consistent with that used by the NRC for licensed nuclear facilities and will prevent DOE EISs from resembling marketing brochures for DOE staff or contractor proponents. This independent review can only better serve

the interests of the American public and taxpayers.

Recommendation: DOE should request a DNFSB review of the TEF draft EIS waste management and accident analysis documentation, publish the results of the DNFSB review within the Final EIS, and describe how DOE intends to resolve any questions raised by the DNFSB review. TEF-02

3. NRC licensing of commercial sales of tritium recovered in TEF or DOE prohibiting all commercial sales for tritium produced in the APT:

Comment: Under 42 USC 2141(a), NRC is authorized to license DOE's domestic commercial sales of tritium as a byproduct material as defined at 42 USC 2014(e)(1) and subject to the licensing provisions of 42 USC 2111 and 2114 as regulated at 10 CFR Part 20 and Parts 30-39 and for purposes of commercial exports at 10 CFR 110.9(c). Unfortunately, under the definition given at 42 USC 2014(e)(1), tritium is an NRC-regulated "byproduct material" only if it is produced in a reactor. This comment does not apply to the TEF for the recovery of tritium from CLWR irradiations.

Thus, if DOE's new source of tritium is the APT, then quantities of tritium recovered in the TEF, unlike the tritium recovered in older DOE tritium facilities from inventories produced in the now shutdown production reactors, are no longer subject to NRC regulation if sold for commercial purposes by DOE. In this case APT-produced tritium falls into the category of accelerator-produced radioactive material (ARM) that NRC claims to have no authority to license and regulate based upon the findings last reported by the NRC in the Policy Issue documented in SECY-92-325, James M. Taylor, Executive Director for Operations, to the Commissioners, "Characterization of discrete NARM and evaluation of the need to seek legislation extending NRC authority to discrete NARM," September 22, 1992 (NRC Public Document Room Accession No. 9204290244A). This policy issue document was issued by the NRC staff at the request of the Commission because a report on the subject requested by Commission Chairman Lando Zech from the Committee on Interagency Radiation Research and Policy Coordination (CIRRPC) was never issued. CIRRPC ceased to exist in 1992, and its replacement, the Interagency Steering Committee on Radiation Standards (ISCORS), which was formed about two years ago, is reportedly not considering ARM regulation on an active basis. Per SECY-92-325, NRC regulation of ARM is not authorized by the *Atomic Energy Act of 1954*, as amended, and therefore ARM falls under the regulatory authority of the States granted under the *U.S. Constitution* and under the regulatory authority of the Environmental Protection Agency (EPA) under the *Toxic Substances Control Act* (TSCA).

It should be noted that SECY-92-325 and several preceding NRC documents cited therein on the subject of regulating both ARM and naturally-occurring radioactive material (NORM) are a little less than clear on the statutory provisions with regard to the licensing and regulation of ARM. Although not directly addressed in SECY-92-325, there is an apparent legal basis for regulating ARM that can be found within the *Atomic Energy Act of 1954*, as amended, but there is no readily clear basis for issuing a license for the ownership, possession, use, production, transfer, or disposal of ARM. NRC would need licensing authority in order to exercise its authorities for requiring financial protection under 42 USC 2210 and for issuing civil penalties under 42 USC 2282. The bases for regulating ARM under the *Atomic Energy Act of 1954*, as amended, stem from 42 USC 2011, 2013(c), 2014(c), and 2201(p) where these statutory provisions provide that (1) NRC can issue any regulation needed to carry out the purposes of the Act, (2) the purposes of the Act are stated to be "to effectuate the policies set forth above [in 42 USC 2011] by providing for...a program for Government control of the possession, use, and production of atomic energy," and (3)

atomic energy is defined to mean "all forms of energy released in the course of nuclear fission or nuclear transformation." Since ARM is created by machine-induced nuclear transformations and since ARM releases other energetic radiations by the process of nuclear transformation involved in radioactive decay, it is technically self-evident that the authority to regulate ARM exists within the *Atomic Energy Act of 1954*, as amended. However, as indicated above, there is no statutory authority given to license any activity associated with the production or use of ARM, as long as the ARM is not also SNM. Since NRC was granted only the "licensing and related regulatory functions of the Atomic Energy Commission" in the *Energy Reorganization Act of 1974* as codified at 42 USC 5841(f) and since NRC is also limited by the "consistent with existing law" provisions of 42 USC 2021b(9)(B) and 10101(12)(B) and (16)(B) with regard to classification authority for nuclear wastes, NRC does not regulate ARM as a radioactive product in use or as a radioactive material being disposed because NRC has no authority under current law to license the production, possession, and use of ARM.

In addition, if a domestic third party were to purchase from DOE tritium that had been produced in the APT and recovered for use in the TEF, since under current law that tritium is not byproduct material, there are no NRC nor Department of Commerce export licensing regulations to preclude its sale to a foreign government seeking tritium for use in a nuclear weapons program. As indicated at 15 CFR Part 774, for Commerce Commodity Control List Item 1B231, "Tritium facilities, plants and equipment," under related controls: "This entry does not control tritium, tritium compounds, and mixtures containing tritium, or products or devices thereof. See 10 CFR Part 110 for tritium subject to the export licensing authority of the Nuclear Regulatory Commission." Thus, the Department of Commerce regulations defer to the NRC regulations to control the export of tritium, but NRC controls tritium only if it is classified as byproduct material as defined in the law. It is noted however that the *Nonproliferation Treaty Act of 1978* modified 42 USC 2139 to add the following words:

> "After consulting with the Secretaries of State, Energy, and Commerce and the Director, the Commission is authorized and directed to determine which component parts as defined in section 2014(v)(2) or 2014(cc)(2) of this title and *which other* items or *substances are especially relevant from the standpoint of export control because of their significance for nuclear explosive purposes*. Except as provided in section 2155(b)(2) of this title, no such component, *substance*, or item which is so determined by the Commission shall be exported unless the Commission issues a general or specific license for its export after finding, based on a reasonable judgment of the assurances provided and other information available to the Federal Government, including the Commission, that the following criteria or their equivalent are met:...(2) no such component, *substance*, or item will be used for any nuclear explosive device or for research on or development of any nuclear explosive device..."

Although this addition to the law appears to imply that NRC has the requisite authority to regulate the export of commercially-sold APT-produced tritium, which could be used in a nuclear explosive device, the current NRC export regulations at 10 CFR Part 110 continue to limit its licensing and regulatory authority only to materials and substances that are defined to be subject to licensing in the *Atomic Energy Act of 1954*, as amended, and to those reactor materials covered in the export control guidelines issued by the Nuclear Suppliers Group (NSG). The NSG export control guidelines that are published by the International Atomic Energy Agency address heavy-water, deuterium and reactor-grade graphite but do not address tritium. Since tritium is also not listed as a dual use item by NSG guidelines, the Department of Commerce has no basis for its regulation as such on the Commodity Control List.

The only regulatory safety net in this unfortunate situation is the exception cited in 10 CFR 110.1(b)(2) for "persons who export...U.S. Munitions List nuclear items." Under Department of State regulations issued under the *Arms Export Control Act*, as authorized under the *International Security and Development Cooperation Act of 1980*, 22 CFR 121.1, Article XVI(a) should be sufficiently broad enough to cover APT-produced, TEF-extracted tritium although 22 CFR 123.20(a) implies that the controls do not apply to items that should be regulated by either DOE or NRC. If this is the only regulatory safety net, then DOE is obligated to tighten the mesh of the net somewhat compared to what it appears to be now.

Therefore, for purposes of DOE domestic commercial sales of any tritium produced in the APT and recovered in the TEF, DOE should not permit such sales unless and until a clear and adequate regulatory regime is in place to control the material being sold with regard to both radiation safety and export prevention. DOE has several options that may be considered to mitigate this problem; these options include:

- Declaring in the *Federal Register* as DOE official policy that no tritium produced in APT and recovered in the TEF will be sold commercially.
- Obtaining an Executive Branch determination under 42 USC 2071 that tritium is SNM subject to NRC regulation.
- Obtaining, with NRC concurrence and assistance, Congressional action to amend the *Atomic Energy Act of 1954*, as amended, either to declare ARM to be byproduct material subject to NRC regulation or to declare that the production, possession and use of ARM is subject to licensing by the NRC.
- Securing EPA regulation of ARM under TSCA as considered in SECY-92-325 and either securing NRC regulation of tritium as a substance usable in a nuclear weapon under 42 USC 2139(b), securing Department of Commerce regulation of tritium as a dual use item (the latter may require action by the NSG), or issuing an official public policy statement that all tritium produced in APT and recovered in the TEF is covered solely for export control purposes by Department of State regulations under 22 CFR 121.1, Article XVI(a).

If DOE were to consider the alternative of mixing APT-produced tritium with existing inventories of previously-produced reactor-generated tritium as a means to effect the mixture's legal status as byproduct material, DOE needs to consider how records would have to be generated and maintained to prove its or the NRC's case in court for alleged violations of the *Atomic Energy Act of 1954*, as amended, in handling materials sold commercially. This alternative is judged to be an unnecessary risk and cost simply to avoid dealing with a legitimate problem in an open and professional manner that warrants public trust.

Recommendation: With regard to the potential of DOE domestic commercial sales of any tritium produced in the APT and recovered in the TEF, DOE should indicate in the final TEF EIS that DOE will not permit commercial sales of APT-produced, TEF-recovered tritium unless and until an adequate regulatory regime is in place to control the material being sold with regard to both radiation safety and export prevention. DOE should describe in detail the possible options, the adequacy of those options, and its specific plans to prevent such sales or to put in place the necessary regulatory controls. Failure to indicate in the TEF EIS how DOE intends to resolve this problem is unacceptable. The public needs to be assured that DOE is planning to act in a responsible manner to mitigate a serious legal question that could adversely effect both public health on a small scale and national defense on a much more serious scale. TEF-03

4. Inapplicability of 10 CFR Part 962 to the regulation of TEF radioactive wastes when contaminated with tritium produced in APT:

For the same reasons as described above for NRC's claimed inability to regulate tritium sold commercially if produced in the APT, DOE's regulations for byproduct materials at 10 CFR Part 962, which are "for use only in determining the Department of Energy's obligations under the Resource Conservation and Recovery Act (42 U.S.C. 6901 et seq.) with regard to radioactive waste substances owned or produced by the Department of Energy pursuant to the exercise of its responsibilities under the Atomic Energy Act of 1954," are invalid for APT radioactive wastes and for TEF radioactive wastes when processing APT-produced tritium.

This inapplicability could be interpreted to imply that all APT and associated TEF radioactive wastes fall under the full regulatory authority of the States and the EPA and are therefore fully subject to any DOE-state compliance agreements with regard to compliance with the *Resource Conservation and Recovery Act* (RCRA) and the *Federal Facilities Compliance Act* (FFCA). Given this interpretation, it appears that for such radioactive wastes DOE would not legally be able separate out the tritium content from other hazardous constituents as its sole regulatory responsibility for treatment and disposal.

As discussed previously, DOE would still be able to regulate occupational radiation exposures during handling of such wastes consistent with the DOE's General Counsel's interpretation of 42 USC 2201(i)(3) as given at Sect. B.1, *Federal Register, 61*, pp. 4209-4910, February 5, 1996, where it is stated that "the requirements in [10 *CFR*] Parts 830 and 835 cover all activities under DOE's auspices with the potential to cause radiological harm."

However, for military applications of atomic energy, 42 USC 2121(a)(3) authorizes DOE to "provide for safe storage, processing, transportation, and disposal of hazardous waste (including radioactive waste) resulting from nuclear materials production, weapons production and surveillance programs." Further, 42 USC 2011, 2013(c), 2014(c), and 2201(p), which were previously argued to provide a basis for NRC to regulate ARM, provide DOE with broad authority not currently reflected in 10 CFR Part 962.

Unless DOE has no objections to the regulation of the treatment and disposal of TEF and APT radioactive wastes by the State of South Carolina under RCRA and FFCA and by the EPA under RCRA/TSCA, the most direct means to avoid any future dispute over regulatory authorities in this situation, if viewed as a potential problem by DOE, would be either to obtain an Executive Branch determination under 42 USC 2071 that tritium is SNM subject to DOE and NRC regulation or to promulgate DOE rulemaking to amend 10 CFR Part 962 to extend DOE's regulatory authority over ARM including tritium produced in the APT and subsequently recovered in the TEF. The latter option would also clarify the issue of DOE regulation of ARM for the public in the upcoming EIS for the Spallation Neutron Source at Oak Ridge and provide a basis to preempt any intervenors from interceding through the states and EPA in the regulation of ARM wastes at DOE's other major accelerator facilities such as Argonne, Brookhaven, Fermi, and Los Alamos.

Recommendation: For the case in which TEF processes APT-produced tritium, DOE should explain in the Final EIS for TEF exactly how it intends to deal with TEF radioactive wastes in light of the current inapplicability of 10 CFR Part 962 in clearly defining the line between DOE authority TEF-04

and EPA/state authority under RCRA/FFCA. DOE should promulgate rulemaking to amend 10 CFR Part 962 or to add other rules to clarify its authority over ARM. This intent should be made clear in the Final EIS discussions of RCRA, FFCA and TSCA as currently given in Chapter 7 of the draft EIS. TEF-04

Respectfully submitted,

David L. Moses, Ph.D., P.E.
Nuclear Engineer

These responses to the June 2 letter from Dr. David Moses commenting on the TEF EIS are reproduced from the TEF EIS.

Response to Comment TEF-01 (Dr. David Moses)

The Defense Nuclear Facilities Safety Board (**DNFSB**) has the authority, under legislation establishing the **DNFSB** and its mission, to provide independent safety oversight to DOE in regard to the operation of defense nuclear facilities. The **DNFSB** from time to time provides recommendations to the Department. As the commenter points out, ambiguities may exist in the Board's authority to provide oversight to TEF and other DOE tritium programs because tritium is not a special nuclear material as defined by the Atomic Energy Act of 1954. As the commenter also points out, DOE cooperates fully with the Board on matters concerning existing and proposed DOE tritium facilities.

As indicated in the draft EIS, because of its radiological characteristics DOE has chosen to apply to tritium operations a number of regulations and standards which also apply to special nuclear material operations. DOE believes this is a conservative approach to safety management for tritium facilities. The regulations (including 10 CFR Parts 830 and 835) and DOE Orders are discussed and listed in Section 7.4 of the Draft EIS. DOE has evaluated the NRC Isotope Facility requirements; those facility NRC requirements that are more conservative and not covered in DOE Orders will be included in the final design of the TEF. DOE has a rigorous regulatory system in place for tritium facilities. Because of this, it is not likely that changes in the definition of DOE nuclear facilities or the designation of tritium as a special nuclear material would change the safety posture of these facilities or of the TEF. Therefore, DOE has not modified the Draft EIS in this regard.

Response to Comment TEF-02 (Dr. David Moses)

The Defense Nuclear Facilities Safety Board (DNFSB) is an independent agency that freely conducts oversight activities of DOE facilities. DOE's Tritium Program has cooperated fully with Board and Board staff requests for information on the TEF. Board and Board staff have been provided briefings on TEF issues, at their request. As the commenter suggests, DOE submitted a copy of the TEF Draft EIS to the Board for review and comment. No comments were received from the DNFSB or DNFSB staff. DOE prepared the TEF EIS early in the facility decision process as mandated by NEPA; implicit in this objective of obtaining early public input is the fact that detailed design information is not available to support the EIS. Assuming that the Department decides to proceed with development of the TEF, detailed design and safety reviews (including independent review and oversight by DNFSB) will be conducted according to DOE policy and established safety practices at appropriate stages of design.

Response to Comment TEF-03 (Dr. David Moses)

The purpose of the proposed action and alternatives evaluated in the TEF EIS is to provide the capability to extract tritium from tritium producing burnable absorber rods irradiated in a commercial nuclear reactor, or targets of similar design, for the sole purpose of supplying tritium to the Department of Defense to support the nuclear weapons stockpile of the United States. Commercial sale of tritium extracted in the TEF, regardless of the source (CLWR or APT), is not contemplated at this time. However, it should be noted that tritium produced in a CLWR does fall within the scope of existing regulations. The commenter points out that it is unclear where regulatory authority rests in regard to accelerator-produced tritium. DOE does not consider "targets of similar design" the preferred target alternative for the proposed accelerator. The preferred alternative, as described in the APT EIS, is to produce tritium in a helium target and extract the tritium at the accelerator facility; the TEF would not be required if the accelerator was chosen as the pri-

mary source of tritium and the helium target technology was implemented. Thus it is unlikely for a number of reasons that commercial sale of accelerator-produced tritium from the TEF will become an issue.

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August 1, 1998

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Mr. Peter N. Brush
Acting Assistant Secretary for Environment, Safety and Health
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Dear Madam and Sir:

Ref: Letter, P. W. Lisowski (LANL) to D. L. Moses (ORNL), APT/PDO-98-059, July
14, 1998.

My letter to both of you is in regard to actions by DOE that I, as a citizen and as a registered professional (nuclear) engineer in the State of Tennessee,
find very disturbing. Although the following is rather long and technically tedious to read, I respectfully ask that you do read it since I believe your timely and appropriate response is vital to re-establishing and maintaining the integrity of DOE's independent oversight of environment, safety, and health activities. As the saying goes, the devil is in the details, and the devils I see lurking are a possible cavalier attitude in some parts of DOE or
its contractors about adhering to nuclear safety requirements and a possible disregard for the legal and regulatory requirements for providing complete and
accurate information in this regard. Please be aware that, as a registered professional engineer in Tennessee in order to maintain my license to practice
in my area of expertise, I am required to be technically competent to recognize situations adverse to public health and safety, to be cognizant of the laws and regulations that apply to assuring public health and safety in my
area of practice, and to assure that all pertinent and relevant information is
included in the professional documents I write. I do my very best to comply with these regulated standards of conduct.

On or about April 22, 1998, I submitted via the Comment page on the DOE/EH Homepage, three comments related to the application of DOE's hierarchy of nuclear safety regulations, orders, and technical standards to the Accelerator
Production of Tritium (APT) in comparison to the manner in which such nuclear
safety requirements are understood to be applied to nuclear reactors. My comments were based on the incomplete safety case for the APT as presented both in the completed Programmatic Environmental Impact Statement (PEIS) for Tritium Supply and Recycle and in the APT's draft Environmental Impact Statement (EIS) for siting at Savannah River. In the past, I have been the author of public comments that DOE had solicited on both of these EISs. I also had an opportunity over a year ago to review one draft document as part of my job. Although I understand that DOE has an Openness Policy on issues of
health and safety, any access to other relevant APT project safety documents,

including archives of weekly and monthly reports, is severely limited due to password protection on the APT homepage. So basically my access to current design and safety information is limited to the EISs and a few open literature
documents.

On July 24, 1998, I received a reply to the comments that I had submitted on the DOE/EH homepage. However, instead of receiving a reply from the independent safety oversight organization (DOE/EH) sent to my home address or
to my America-On-Line e-mail address given with my comments, I received the reference letter from the DOE-contractor proponent sent to my place of work with senior management on distribution. Dr. Bill Bishop at DP-61 was also on
distribution, but no one from DOE/EH was included. I assume that each of your
offices can obtain a copy of the reference letter from Dr. Bishop; otherwise I
will be glad to send a copy to each of you. Although the manner in which my comments were answered raises serious questions in my mind about how Federal laws relating to privacy were handled in the actions taken by both DOE and the
proponent, my concern is now not how the letter was sent to me and my management but what the method employed implies about the attitude within DOE
to persons who raise questions about regulatory compliance relating to public
health and safety and environmental protection.

The LANL letter indicates that DOE/EH forwarded my comments to the APT proponent organization within DOE for their response "to ensure accurate and consistent answers." The responses given in the attachment to the reference letter imply that DOE endorses the positions documented therein since such wording as "DOE disagrees with..." and "DOE disagrees strongly with..." is used.

I am quite surprised by this situation since I expected an answer to my comments to come to my home for my personal edification and to be issued from
DOE/EH as the independent safety oversight organization to whom my questions had been addressed. My understanding of the law as given at 42 USC 7274m(a) is
that "The Secretary of Energy shall take appropriate actions to ensure that
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(1) officials of the Department of Energy who are responsible for independent

oversight of matters relating to nuclear safety at defense nuclear facilities
and enforcement of nuclear safety standards at such facilities maintain independence from officials who are engaged in, or who are advising persons who are engaged in, management of such facilities." My understanding from the
Mission Statement on the DOE/EH Homepage is that DOE/EH strives for "strong and independent oversight of environment, safety, health,..." and that DOE/EH
has as a "specific function" the role of conducting "independent oversight activities that provide a comprehensive, accurate understanding of the state of environment, safety, health,..." I note that DOE/EH is also charged at 10
CFR 1021.105 with oversight of DOE activities for implementing compliance with
the National Environmental Policy Act (NEPA). Since my comments were about the nuclear safety aspects of the proposed APT as presented to the public in the EISs for a new defense nuclear facility that DOE/EH is charged with reviewing, I am left wondering as to whom I should seek satisfaction about the
manner in which my inquiry has been handled with regard to adherence to letter
and the intent of 42 USC 7274m as well as NEPA and other laws. Is this the way DOE/EH meets the requirement at 40 CFR 1500.1(b) that the environmental information presented in the EIS "must be of high quality?" No independent oversight, simply defer to the proponent? My understanding is that this is not the public's nor Congress' expectation of how DOE is supposed to comply with NEPA.

I note that, if an applicant for a license to construct or operate a commercial nuclear reactor deliberately provides inaccurate or incomplete information in the Safety Analysis Report or Environmental Report submitted with the license application to the U.S. Nuclear Regulatory Commission (NRC) and thereby causes the NRC's EIS to be in error, the applicant is subject to the NRC's regulatory provisions relating to completeness and accuracy of information and to deliberate misconduct and would thereby be subject to both
civil and criminal penalties. Since the reference letter from a DOE contractor purports to reflect official DOE positions on matters of compliance
with nuclear safety requirements, may I assume that the provisions of 10 CFR 820.11 apply to this letter with respect to the completeness and accuracy of information relating to a DOE nuclear activity? Or, does LANL's exception granted under 42 USC 2282a(d)(2) provide cover for both the letter's author and the DOE officials, if any, who sponsor his actions? However, do I also understand correctly that the authors of this letter may be held accountable to one or more of the provisions at 18 USC 371, 912, 1001, 1018, 1031(a), or 2071(b)? Is an EIS for a nuclear facility subject to 10 CFR 820.11? Is the provision of information to an EIS subject to any of the provisions of Federal
law as cited above? My assumption is that the answer at least to the last question is "yes."

I would prefer that technical differences of opinion between professionals be
resolved by personal interactions and discussion or at least be made well-defined by public debate in open forum among peers. The problem with technical differences of opinion that may be interesting to debate on the telephone or at a meeting of a technical society is that they grow into harsh
and very real legal issues when they deal with the legal and regulatory aspects of providing official information regarding public health, safety and
environmental protection that is to be presented in public documents issued to
address official decision-making by the government. This is when a technical
professional like me has to recognize himself to be and to act accordingly as
a state-licensed professional engineer with a mandated obligation to place public welfare above other considerations. In this respect, please consider the following differences of opinion with regard to accuracy and completeness
of some of the "official" positions taken by "DOE" in the reference letter which was prompted by may asking the same questions of DOE/EH about the EIS:

o The reference letter states that "The APT facility is properly categorized in accordance with DOE-STD-1027-92." Please note that, although not acknowledged in the letter, the radionuclides listed in Table A.1 of DOE-STD-1027-92 and for that matter (to the best that I can determine) in the various references listed in Attachment 1 of the standard include "no" radioactive isotopes of tungsten. Such radioactive isotopes would be expected
to exist in substantial quantities as activation products in the APT target as
the result of irradiation by the proton beam and by resulting neutron flux. In fact, all the radioisotopes listed in DOE-STD-1027-92 appear to be fission
products, activation products, and actinides that one would expect to encounter primarily in nuclear reactors and associated fuel cycle facilities.

It is generally recognized that spallation and activation products in an accelerator-driven target-blanket composed of non-fissionable heavy metals will have a substantially different mass distribution than fission products. Thus stating that the "APT facility is properly categorized in accordance with
DOE-STD-1027-92" begs the question of whether the statement is both complete and accurate since the cited standard fails to address many of the radionuclides (20-30 million Curies per the draft PEIS) that are predicted to
exist within the target-blanket of the APT during and following operation. L7-01

The high radiation hazard posed by irradiated accelerator targets made of materials such as tungsten is also a matter of record for accelerators that are orders of magnitude smaller than the APT (See Occurrence Report Number ALO-LA-LANL-RADCHEM-1996-0010, "Unposted High Radiation Area on the Roofto above TA-49-1 Hot Cells," 10/11/1996). How can one apply a standard that is technically either not applicable or insufficient to be applied without additional qualification? The interim guidance in Attachment 1 to DOE 5480. 23
states that the hazard analysis "should identify the inventory of hazardous materials (type and amount), including radioactive materials" and make a

"hazard classification in keeping with the requirements of paragraph 8c of this Order." So, if the APT target-blanket contains about 20-30 million Curies of radionuclides that are known to pose a high radiation hazard and are generally comparable to the activity level in a 50 MWth reactor, and if reactors exceeding 20 MWth are classified in Attachment 2 to DOE 5480.30 as being Category A that is recognized to be equivalent to a Category 1 Hazard facility in DOE 5480.23, by simple engineering analogy, why is the APT target-blanket a Category 2 Hazard facility? It does not make engineering sense, so what other technically defensible reasons are there?

o As indicated above, the reference letter states that "The APT facility is properly categorized in accordance with DOE-STD-1027-92." The letter also states that "Each independent facility segment has been based on a maximum-credible release of the entire radionuclide inventory present." What is "maximum-credible?" These words are not used anywhere in DOE 5480.23 including Attachment 1 nor in DOE-STD-1027-92. "Credible" is used in Sect. 3.1.2 of DOE-STD-1027-92 only in connection with considering chemical and physical forms of materials and dispersive energy sources for facilities that are initially found to be Category 2 Hazards without making such considerations at the beginning of the analysis. Sect. 8.c of DOE 5480.23 states that the hazard analysis "shall identify energy sources or processes that might contribute to the generation or uncontrolled release of hazardous materials" and "shall estimate the consequences of accidents in which the facility or process and/or materials in the inventory are assumed to interact, react, or be released in a manner to produce a threat or challenge to the health and safety of individuals on site and off site." Further, Sect. 3.1.2 of DOE-STD-1027-92 states that the final hazard categorization is "not to consider safety features (e.g.,ventilation system, fire suppression, etc.) which will prevent or mitigate a release," and Sect. 4.1.1 of DOE-STD-1027-92 states that "preventive and mitigative features are not to be considered in hazard categorization." Yet from the reference letter it is stated that loss of target cooling with failure to trip the beam is "due to the reliability of systems involved...an incredible event," that "failure to trip the beam' is considered an unmitigated event," and that "in these analysis it is subsequently shown that the initiating event is mitigated assuming the worst case single failure in the mitigation system." Thus, the APT project staff apparently ignore the precise wording of the DOE order and standard. The order and standard indicate that the hazard categorization is to be based on unmitigated and interactive failures and that credible release fractions are allowed to be considered only for facilities that are initially found to be Hazard Category 2. The reference letter implies that the APT hazard categorization assumes mitigation (that is, tripping the beam) presumably for the sole purpose of moving the Hazard Category rating from 1 to 2.

L7-02

What goes on here? It is not my impression that DOE issues nuclear safety requirements documents for broad public consumption and then allows its program offices and contractors to modify the intent of the stated requirement to allow themselves flexibility in meeting program objectives (such as winning public acceptance in an EIS?) without providing the public with complete and accurate information about what is actually being done and why. This simply cannot be official DOE policy. No one I know in DOE would think of suggesting let alone defending such an approach to Congress.

o Why does APT need to assume the beam always trips? The answer to this question is not given in the reference letter but can be deduced from the letter by a competent engineering professional with a commitment to public safety, so I am sure that DOE/EH either has not been presented with all the facts by the proponents or has not had time to evaluate the proponents' submittals in sufficient detail.

L7-03

In the reference letter, the Inconel-clad tungsten target cylinders are stated to heat up at full power in the beam without cooling at heat-up rates varying from 150 degrees C per second to 450 degrees C per second. Assuming that the Inconel and tungsten are at an initial temperature of about 100 degrees C and assuming from a handbook that the melting and boiling temperatures of tungsten are 3410 degrees C and 5660 degrees C respectively, the heat-up rates given in the letter, ignoring physical relocation and any change in density and specific heat with temperature or change in phase, imply that the tungsten will melt in less than 7.5 seconds and boil in less than 12.5 seconds when cooling is lost in the highest power sections of the target with no beam trip. Under the same conditions and using higher-end handbook values for major metals in the alloy, the Inconel clad would melt at less than 1600 degrees C and boil at less than 2800 degrees C and would have a time delay in sensing the heat deposited in the tungsten of a few seconds at most.

The clad would thus likely melt or boil before the tungsten but not by much. In the lower power regions, the heat-up rate quoted in the letter implies that tungsten target melting would occur in less than 23 seconds and boiling in less than 38 seconds. Thus, if the structural integrity of the high-power region of the target fails so it melts and slumps down and away from the beam, the heat-up rate in the remaining initial low-power regions would increase thereby accelerating progressive structural failure as the whole target becomes molten most likely in much less than 20 seconds. What would happen if the target lost cooling and the beam did not trip for about 10 seconds at which time a malfunctioning automatic system or an operator in the target station, not knowing that there was no beam trip, restarted full coolant flow. What happens if this occurs at 20 seconds? At 30 seconds? Can you imagine a flood of water pumped into a cavity filled with molten metal and metal vapor?

The letter would have the reader believe that steam explosion is not possible

due to uneven heating in the target under beam irradiation, but the letter fails to indicate how long a delay in beam trip was considered in their analysis of the target condition at the time cavity flooding would occur.

The NRC often requires assuming a ten minute delay before the operator takes any action or takes the proper action. APT cannot tolerate ten minutes of the beam on with no cooling and probably cannot tolerate 5 seconds without active mitigation by the beam trip. For an assumed delay in beam trip of only 5 seconds with no cooling, the degree of damage in the higher power regions of the target would most likely be comparable to what occurred in the center of the core during the Three Mile Island Accident many minutes into the transient after the operators took the wrong actions by throttling the emergency core cooling system.

The reference letter alludes to the Chernobyl accident as the reason why reactors must have negative feedbacks that are argued in the letter to make no sense in APT. However, the core design was only part of the root cause at Chernobyl. Human error played the dominant role in both the design flaws and the operator errors. At APT, human performance will dominate the design, construction, testing, operations, maintenance, and inspection of the trip system for the beam. Demands for high-availability to produce tritium will require immunity from spurious trips thus forcing the simplification of channels that can actually actuate a trip and adding pressure to management to allow jumpering-out of nuisance trip signals. Minimizing unwarranted trips while maintaining high safety margins in commercial reactors has been no easy trick and has taken many years to achieve under the ever-present oversight of the regulator. The reference letter asserts that there are multiple ways to trip the beam. I note that many applicants to the NRC have indicated that there are multiple ways of accomplishing safety functions, but NRC has adopted the "primary success path" approach for technical specifications to assure that a minimum set of redundant and diverse safety mechanisms are assured to be operable when the plant is operating. In addition, the NRC standard review plan still requires accident analyses of anticipated transients without scram no matter what the initiating event or transient and regardless of the fact that there are multiple ways to trip the reactor most of which are addressed in the limiting conditions for operation in the technical specifications. This is defense in depth where inherent mitigative features of the design play an important role in making the deterministic safety case as the degree of postulated challenge posed by the regulator moves through the design basis and beyond. APT lacks such mitigative features and must always rely on active mitigation to trip the beam and avoid catastrophic loss of target integrity that can occur in seconds. But the reference letter indicates that full compliance with the DOE nuclear safety requirements has been met in defining APT to be a Hazard Category 2 facility. I cannot believe that any DOE manager would knowingly countenance such claims if he or she had been presented all the pertinent and relevant information.

So, why does APT need to assume the beam always trips? The proposed project costs a lot of money. To win political advantage with the public who must pay for the project, any proponent would be very hesitant to admit that the facility will always operate just seconds away from a catastrophic loss of investment if not a smaller scale but very expensive repeat of the lessons that were supposed to have been learned at Chernobyl. Apparently, if DOE safety requirements stand in the way of making the facility appear much less safe than the proponent would like in order to sell the proposal, he may be tempted to massage their application until he gets the result he wants. Is this Integrated Safety Management (ISM)? Not in the DOE I know! Redefining ISM to have the double meaning "I See Money" therefore "I Sell Misinformation" is not the DOE I know in Oak Ridge. This may be much more than merely putting the best foot forward; once knowingly obfuscated in an official document, this may be a criminal act.

o Finally, the letter provides a discussion of DOE's purported plans to dispose of APT radioactive wastes indicating that the expectation is for near-surface land disposal at the Savannah River Site. The letter acknowledges that the current DOE 5820.2A requires a "special (sic) performance assessment"for Greater-than-Class-C radioactive wastes without acknowledging that this assessment requires action under NEPA. The reference letter then indicates that APT radioactive waste disposal will fall under the new DOE O 435.1 (now only in draft) and that DOE is going to address the disposal of APT radioactive wastes as special case waste, which the letter indicates is the better classification for APT radioactive waste than NRC's Greater-than-Class-C as used in the draft EIS. This assertion is very interesting since I cannot find, using electronic searches on DOE's homepages, that the words "special case waste" are defined or even mentioned in draft DOE O 435.1 and its accompanying draft guidance document (DOE G 435.1) and draft manual (DOE M 435.1). The assessment mentioned in the draft DOE G 435.1 does not appear to require an EIS and apparently is based upon using guidance documents that do not seem to exist yet. I also cannot find in the draft DOE O 435.1 any correlation of the term "radioactive waste" with the demarcation between the Atomic Energy Act and the Resource Conservation and Recovery Act as it appears in 10 CFR Part 962; such a demarcation appears in the definition for "radioactive waste" as given in DOE 5820.2A. L7-04

In reality, radioactive wastes generated in APT do not contain special nuclear material, source material, or byproduct material as defined in the

Atomic Energy Act of 1954, as amended, and as codified at 42 USC 2014. Therefore, consistent with 10 CFR Part 962 and the official positions taken by NRC (NUREG-1310 and SECY-92-325), APT radioactive wastes will fall under the Resource Conservation and Recovery Act as meeting the definition for "solid waste" codified at 42 USC 6903(27) and should be regulated as "hazardous waste" under the definition at 42 USC 6903(5) by the Environmental Protection Agency (EPA) and by the State of South Carolina under the Federal Facilities Compliance Act. Thus in this case, APT high-hazard radioactive wastes will be subject to listing as hazardous waste under 42 USC 6921 and subject to all the standards and permitting requirements at 42 USC 6922, 6924, and 6925. Since EPA has not promulgated land disposal restrictions previously for this type waste, it is expected that rulemaking, EISs and public meetings will be required.

However, as I have suggested before in public comments on DOE EISs, it would appear to be easier if DOE and NRC would either take a public position on rulemaking to cover this type of radioactive waste under various existing provisions of the Atomic Energy Act or have Congress amend the Atomic Energy Act to include accelerator-produced radioactive materials within the Act and then DOE could issue regulations analogous to NRC's at 10 CFR Part 61 to classify its wastes equivalently to commercial practice for NRC-licensed facilities. Accounting for the equivalent hazard posed by APT radioactive wastes, this latter approach would most likely make APT's most radioactive wastes Greater-than-Class-C Low-Level Radioactive Wastes, which currently must be disposed in a geologic repository per the NRC regulations unless NRC approves another method. The DOE EIS for APT should reflect the proper legal requirements.

The reference letter's explanation of how DOE intends to achieve land disposal at Savannah River for APT's radioactive wastes seems a bit confused or maybe disingenuous. Is the APT proponent trying to bypass EPA's statutory authority in this matter without going to Congress, without public rulemaking in conjunction with NRC, and without having to perform an additional EIS? Clarity is needed here. How can one assert that a path forward exists when the path indicated is based on draft and non-existent guidance documents and appears to be at odds with statutory realities? Does the reference letter meet its reported DOE requirement "to ensure accurate and consistent answers? "

Thank you for reading my differences of opinion with the information provided in the reference letter. I hope that my sharing these with you is more productive and handled more discretely within DOE than my previous attempt to use the DOE/EH Comment page. I would hope that you can find a resolution to my concerns both about how my previous inquiry has been handled and about how the technical and legal issues that still remain for the APT safety case as presented in the EIS can be resolved satisfactorily for DOE, for the proponent, for the public, and for me. Please contact me if you have any questions or other needs. The comments and clarifications given above are in my professional judgment important issues that call into question the integrity of DOE as a self-regulating agency. I would prefer that DOE make the changes necessary to continue self-regulation at least for existing facilities, but, if there have already been decisions made that this role is to be given up, then please feel free to forward my comments to the appropriate official within the U.S. Nuclear Regulatory Commission. I sincerely appreciate your time and attention, and I look forward to your response.

Sincerely and respectfully submitted,

David L. Moses, Ph.D., P.E.

cc: Dr. Elizabeth A. Moler, Acting Secretary of Energy

Response to Comment L7-01 (Dr. David Moses)

See response to L6-01.

Response to Comment L7-02 (Dr. David Moses)

The credible and incredible releases from APT were determined based on DOE-STD-1027 considering material quantity, form, location, dispensability, and interaction with available energy sources. No credit has been taken in these analyses for mitigation from active safety features (e.g., pumps starting, valves opening or closing). However, mitigation of releases based upon passive safety features relying upon natural laws was considered. See also response to L6-01 regarding hazard categories.

Response to Comment L7-03 (Dr. David Moses)

See response to L3-08.

Response to Comment L7-04 (Dr. David Moses)

See response to L3-01.

Verbal Comments:

Transcripts of the messages left on the DOE message line:

Ms. Mary Barton (Comment P1-01)

I had gotten a letter from you about a meeting in North Augusta on January 13, 1998 at the Community Center. And I would just like to give my opinion on what I think of the situation in the backup Tritium Production Technology. I am fully aware that we need this plant down here and these situations. But I am fully aware of the environmental impact and what it's had on people in the area, the illness, the sickness that has been ignored because Westinghouse is one of the worst polluters that we have ever had here and their management and everything. We can not stand another year of this kind of stuff in this area. The people's health will not permit it. And I want to know what's going to be done to make it safe because Westinghouse is the worst we've ever had of the abuse of their employees not only medically and physically neglect and everything out there. And I am one citizen that is concerned about it and I want to know what's going to be done about it. Thank you.

Response to Comment P1-01 (Ms. Mary Barton)

The Department is committed to providing a safe work place for its employees and to being a good corporate neighbor. The Department strives to operate within permit conditions and adheres to all applicable laws and regulations. Historic SRS accident rates have been low and are discussed on page 3-44 of the Draft EIS. The safety and health of SRS workers and the public continue to be of paramount concern to the Department of Energy. The APT would be designed, constructed, and operated with the highest degree of safety.

Mr. Marvin Lewis (Comment P2-01)

I wish to voice my comments into the record on the Draft EIS which I have just received the *Environmental Impact Statement Summary Accelerator Production of Tritium at the Savannah River Site*. Please do not send me this entire EIS, the summary is sufficient.

I would say from the summary that this is another ridiculous project for a product that is totally unnecessary. There is plenty of recycled tritium available on the market from various other sources. And there's also recycled tritium on the market from Russian nuclear bombs and materials. And there's plenty of extractable tritium from various uses including commercial and military. The idea that we have to put in this gold-plated monstrosity called an accelerator at the Savannah River is just another boondoggle having no real reason except to distribute money to the educated and friends of the DOE or DOD or DOI or whatever or South Carolina or whatever. I'm sure there are plenty of people with their hands out for that money. That doesn't mean we should go ahead with this ridiculous project. I hope I am making it clear that I am not, repeat NOT, that's negative, in favor of this ridiculous project. There are many other good things to do with money. We don't have to throw it away in a hole in the ground. Thank you.

Response to Comment P2-01 (Mr. Marvin Lewis)

Section 1.1 of the Draft EIS describes the stockpile requirements, existing tritium supplies, and the projected need date for a new tritium source. The U.S. Department of Energy is accountable to the Congress for the expenditure of funds appropriated by the Congress for all of the Department's activities, including the tritium program. The amount of tritium that could be expected to be recovered from retired weapons would not sustain the long-term need under current stockpile requirements. A safe, reliable, domestic sup-

ply is required to maintain levels determined by national defense policies. DOE also considered the purchase of tritium from other sources, including foreign nations as part of the process for the Tritium Supply PEIS. Conceptually, the purchase of tritium from foreign governments could fulfill the tritium requirement. However, while there is no national policy against purchase of defense materials from foreign sources, DOE has determined that the uncertainties associated with obtaining tritium from foreign sources render that alternative unreasonable for an assured long-term supply.

Mr. Marvin Lewis (Comment P3-01)

I've got further comments on this idiotic DOE EIS-0270D, *Environmental Impact Statement Accelerator Production of Tritium at the Savannah River Plant*. If you will notice in the NRC's documentation, U.S. Nuclear Regulatory Commission, Office of Public Affairs, Washington, DC 20555, week ending September 19, 1997, Volume 17 Number 38, News Releases. And you can also get it over the Internet opa@nrc.gov or telephone 301/415-8200. This is release number 97-133 September 15, 1997. NRC amends operating license of what part is to permit limited production of tritium for Department of Energy. Yes, tritium is being produced in the United States. Yes, it is being produced at commercial sites. It is being produced in any quantity you would care to produce it in since it arises from lithium. Now the idea of then having to put billions of dollars into a hole in the ground for an accelerator becomes more and more stupid even though I thought it couldn't get any stupider. Thank you.

Response to Comment P3-01 (Mr. Marvin Lewis)

DOE is the sponsor of the commercial light water reactor tritium production research currently underway at the Tennessee Valley Authority's Watts Bar reactor. The purpose of this research is to evaluate the design of a target assembly for use in a commercial light water reactor, and to test related NRC licensing requirements. The Watts Bar experiment, which will produce about an ounce of tritium, is the only extractable tritium production occurring in the United States.

On December 22, 1998, Secretary of Energy Bill Richardson announced that commercial light water reactors (CLWR) will be the primary tritium supply technology. The Secretary designated the Watts Bar Unit 1 reactor near Spring City, Tennessee, and Sequoyah Unit 1 and 2 reactors near Soddy-Daisy, Tennessee as the preferred commercial light water reactors for tritium production. These reactors are operated by the Tennessee Valley Authority (TVA), an independent government agency. The Secretary designated the APT as the "backup" technology for tritium supply. As a backup, DOE will continue with developmental activities and preliminary design, but will not construct the accelerator. The selection of the CLWR reaffirms the December 1995 Tritium Supply and Recycling PEIS ROD to construct and operate a new tritium extraction capability at the SRS.